











Digitized by the Internet Archive  
in 2022 with funding from  
University of Toronto

<https://archive.org/details/31761115469942>















Report No. 1 of the  
**NORTH BAY DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management  
Ontario Department of Lands and Forests

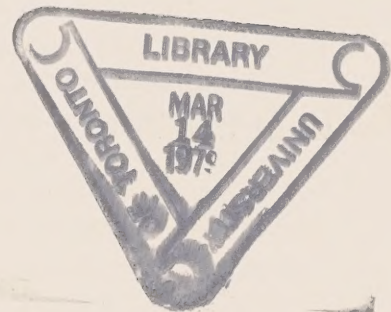




# *Forest Resources Inventory*

— 1953 —

Report No. 1 of the  
**NORTH BAY DISTRICT**



Division of Timber Management  
**Ontario Department of Lands and Forests**



# PREFACE

● One of the important undertakings of the Department of Lands and Forests, in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to the Province, one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

The past half century, little more than one half a rotation period in forest growth has witnessed the origin and rise of the pulp and paper industry to the position of "Canada's Leading Industry." Advances through research and development in processes of manufacture are going forward at an accelerated rate. The possibility of manufacturing present wood waste, unused species and qualities; economically into marketable products offers a challenge to research, their quantities give it direction. Modern forest inventory has therefore shifted from its former position of concentration on giving presently utilizable volumes, to one of presenting the forest resource picture as a whole. The volume of the primary growing stock in cubic feet gives the total wood resources. From these figures, not only can the volume of utilizable wood under present economic and industrial conditions be calculated, but these estimates may be adjusted also, to the progressive change in utilization standards in a rapidly developing economy.

For purposes of administration of the renewable natural resources of the Province, the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these forest administrative districts, totalling 172,000 square miles, and comprising the accessible forest area of Ontario. This report deals with the results of the inventory in the North Bay district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the province as a whole. This objective may be attained most effectively, through the use of the comprehensive forest resources data in the preparation of long term timber management plans.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	20
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	23
AREAS.....	9	APPENDIX.....	26
FOREST LAND OWNERSHIP.....	10	SURVEY METHODS.....	26
AGE CLASSES.....	10	MEAN ANNUAL INCREMENT.....	26
REGIONAL FOREST TYPES.....	11	AGE CLASSES.....	26
COVER TYPES.....	12	ROTATION.....	26
VOLUME.....	13	ALLOWABLE CUT.....	27
CONIFERS VS. HARDWOODS.....	14	CULL FACTOR.....	27
SAWLOGS VS. PULPWOOD.....	15		

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES.....	9	FIG. 12 — VOLUME OF THE PRIMARY GROWING STOCK OF PRINCIPAL HARDWOOD SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	17
FIG. 2 — NORTH BAY DISTRICT, 1948.....	10	FIG. 13 — VOLUME OF IMMATURE TIMBER BY SIZE CLASSES ON PATENT LAND.....	17
FIG. 3 — LAND OWNERSHIP WITHIN THE NORTH BAY DISTRICT.....	10	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE NORTH BAY DISTRICT.....	21
FIG. 4 — ECOLOGICAL DIVISIONS.....	11	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND.....	22
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	12	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENT LAND....	22
FIG. 6 — VOLUME OF THE PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNER- SHIP.....	13	FIG. 17 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENT LAND.....	23
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	14	FIG. 18 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS BY SPECIES ON CROWN LANDS.....	24
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	15	FIG. 19 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF HARDWOODS BY SPECIES ON CROWN LAND.....	24
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	15	FIG. 20 — AREA COMPANY INVENTORY USED.....	26
FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON PATENT LANDS BY SIZE CLASSES.....	15		
FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	16		





# SURVEY HIGHLIGHTS

1. The total area of the North Bay district is 3,482,164 acres, 5,441 square miles. Productive forest lands occupy 2,740,029 acres, 79 per cent of the total area, water covers 11 per cent of the total area and 10 per cent is made up of non-productive forest lands and lands withdrawn from forest use.

2. Privately owned lands cover an area of 480,115 acres, 14 per cent of the total area. Only 11 per cent of the productive forest is privately owned. Developed agricultural lands occupy 117,580 acres or 24 per cent of the total area under private ownership.

3. The total timber resources of the North Bay district are just under four billion cubic feet. More than one-half of this volume is made up of hardwoods, principally poplar and white birch. White and red pine, the most important saw timber species, makes up over one-third of the softwood volume. Spruce and balsam, the premier pulpwood species, comprise somewhat less than one-third of the softwoods. The balance of the softwood is made up of jack pine, hemlock and cedar.

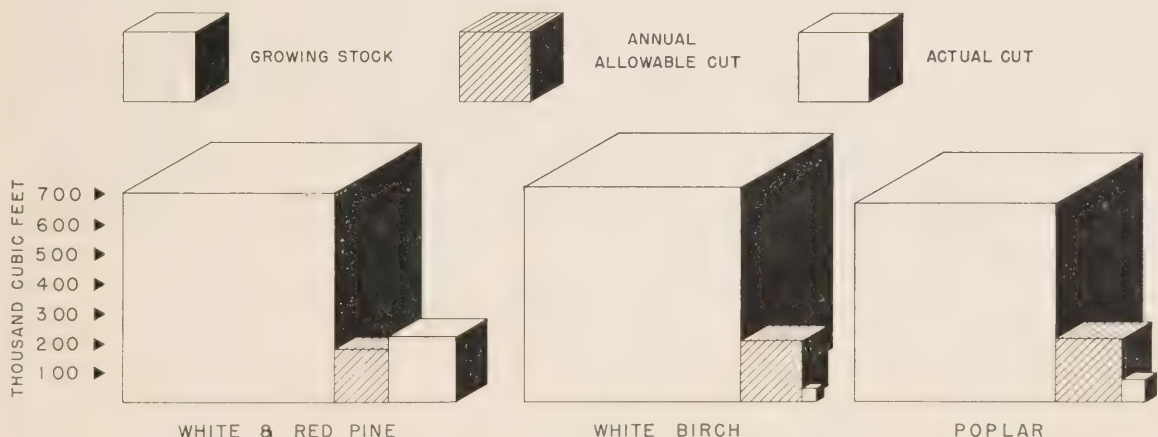
4. The annual allowable cut, or net depletion allowable under sustained yield management, is

87 million cubic feet. Of this total allowable cut, 90 per cent is on Crown lands and 10 per cent on patented land.

5. The valuable conifer or softwood species make up only 39 per cent of the allowable cut and the hardwoods, mainly poplar and white birch, comprise the major portion 61 per cent of the total allowable cut.

6. A comparison of annual allowable cut with the actual utilization of timber for Crown lands in the North Bay district indicates that the two pines, red and white, were cut at a rate more than double that permitted under sustained yield regulations. If red and white pine continue to be utilized at these rates, the present mature timber stands will be exhausted within the next twenty years. At the end of that period white and red pine would come, for the most part, from presently immature stands, and the allowable cut may then drop from its present 31 million feet to about 8 million feet board measure. Only 9 per cent of the allowable cut of hardwood species, poplar, white birch and others, is currently utilized in the North Bay district.

THE ACTUAL CUT AND ANNUAL ALLOWABLE CUT IN RELATION TO GROWING STOCK









*Forest resources inventory photograph of City of North Bay taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area of the North Bay district excluding Indian Reserve lands is 3,482,164 acres (table 1), 5,441 square miles, made up of 130 surveyed townships. Water covers an area of 384,831 acres, 11 per cent of the total area, leaving a net land area of 3,097,333 acres. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 183,672 acres, slightly over five per cent of the total area. Non-forested lands, including lands permanently withdrawn from timber production, comprise 173,632 acres or about five per cent of the total area (fig. 1). In this classification are the important developed agricultural lands amounting to 126,132 acres, pasture lands totalling 6,295 acres

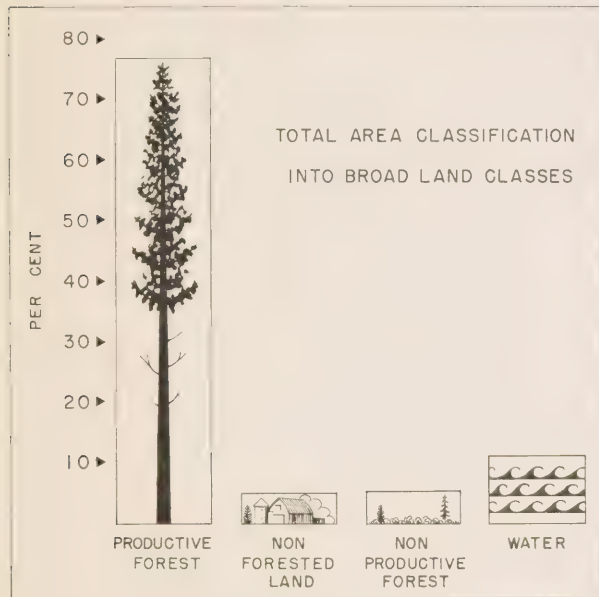


FIGURE 1

and lands occupied by cities, towns, villages, roads and railroads or otherwise withdrawn from forest production. Owing to the general thin, rocky nature of the soil mantle covering the bed-rock of the "Canadian Shield" in Ontario, it seems unlikely that agricultural development will expand far beyond its present limited boundaries in this district.

The North Bay district is essentially a timber producing area with 2,740,029 acres or 79 per cent of the total area classified as productive forest land (fig. 1). The district originally contained some of

the finest red and white pine stands in Ontario, mixed with tolerant hardwoods, maple and yellow birch in the southern part of the district. The tolerant hardwoods disappear as important components of the forest as the northern boundary of the district is approached, giving way to the typical spruce-fir stands of the Boreal forest zone. Black and white spruce, balsam and jack pine are important components of the stand, especially in the northern part of the district.

Over the past fifty years the virgin red and white pine forests have been intensively operated for sawlogs to support a thriving sawmilling industry. Due to the exhaustion of the virgin pine stands in the southern part of the district the sawmilling industry has moved to the north central part, where it will

TABLE 1. — *Total area classification into broad land and ownership groupings.*

Kind of area	Crown land	Patented land	Total
	<i>acres</i>	<i>acres</i>	<i>acres</i>
Productive forest land <sup>1</sup> .....	2,434,684	305,345	2,740,029
Non-forested land <sup>2</sup>			
Developed agricultural land.....	8,552	117,580	126,132
Grass and meadow land.....	833	5,462	6,295
Non-reproducing burn.....	14,958	5,305	20,263
Unclassified land <sup>3</sup> .....	6,003	14,939	20,942
TOTAL.....	30,346	143,286	173,632
Non-productive forest <sup>4</sup>			
Open muskeg.....	79,452	5,251	84,703
Treed muskeg (scrub).....	26,338	1,175	27,513
Brush alder and flooded land.....	33,824	20,367	54,191
Rock outcrop.....	9,074	4,457	13,531
Barrens.....	3,500	234	3,734
TOTAL.....	152,188	31,484	183,672
Water.....	384,831	.....	384,831
TOTAL AREA.....	3,002,049	480,115	3,482,164

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

Lands occupied by roads, railroads, towns etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

continue for a number of years on a declining scale.

Many of the original pine areas, as a consequence of logging and forest fires, are now covered with second growth poplar and white birch stands. In the southern part of the district hard maple of low quality, along with other broad-leaved species, has tended to replace the softwoods after logging on the good growing sites.

### Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort, and for other uses. All of these various types of ownership are grouped under "Patented Lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at time patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands is therefore an intricate mosaic. In the course of the inventory no attempt has been made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

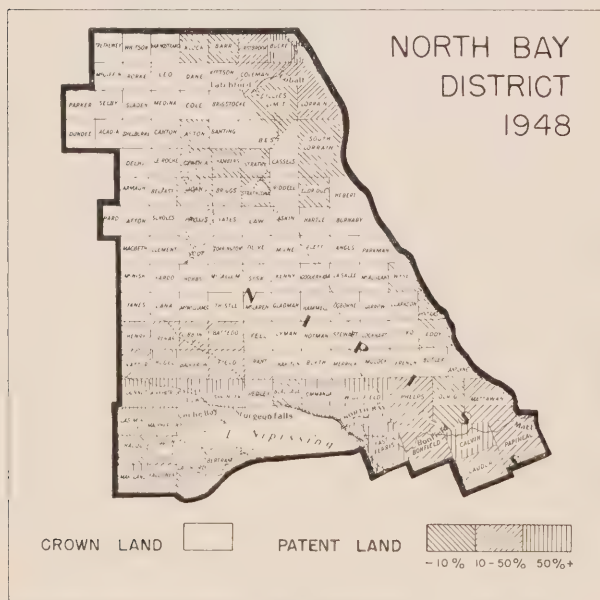


FIGURE 2

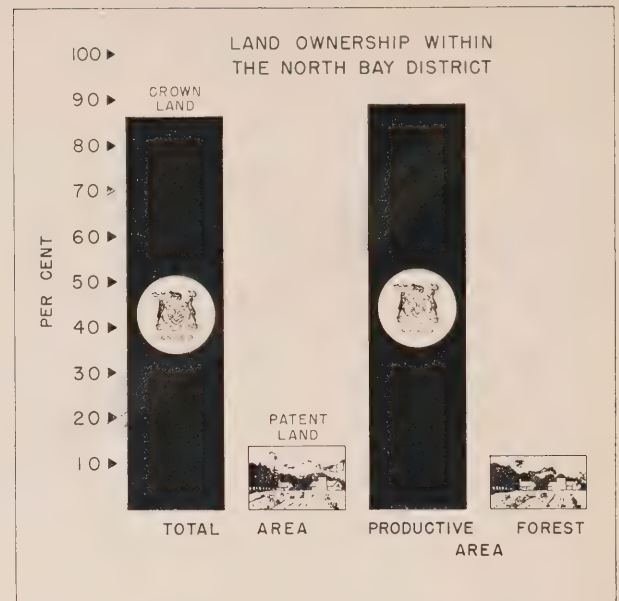


FIGURE 3

Of the total area of the North Bay district of 3,482,164 acres, 3,002,049 acres are in the ownership of the Crown and 480,115 acres patented (table 1), 86 per cent of the total area is Crown land and 14 per cent is patented land (fig. 2). Considering only the productive forest land totalling 2,740,029 acres, 89 per cent is in Crown ownership and 11 per cent patented (fig. 3).

Developed agricultural lands occupy 117,580 acres or 24 per cent of the total patented land area. An additional area of 8,552 acres of developed agricultural land is in Crown ownership. This is for the most part, located lands for which patent has not been issued.

### Age Classes

For sustained timber yields, a forest should be made up of trees of all age classes and stages of development from seedlings to mature timber, in such proportions that when one group of trees is harvested, another is ready to take its place. The present forests of the North Bay district do not meet this requirement.

For the district as a whole, 848,170 acres or 31 per cent of the productive forest is mature, 1,269,101 acres or 46 per cent is immature and 622,758 acres or 23 per cent is in young growth and reproducing forest class (table 2). The age class distribution shows a surplus of second growth or immature timber area, a slight deficiency in the mature class and a sub-normal area of young growth and reproducing forest.

The age class distribution for the Crown land area is somewhat nearer normal than for the area as a whole. The patented lands are very deficient in mature timber area with only 2 per cent of the productive forest land in this class; 52 per cent of the area is in the second growth class and 46 per cent is classified as young growth. Unless the cut on privately owned lands is reduced to the point that only improvement cuttings and thinnings are removed and the timber permitted to grow to larger sizes, these lands can produce very little timber above pulpwood or cordwood size classes.

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	Productive forest
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	128,253	522	128,775	5
Hardwood.....	122,209	1,181	123,390	4
Mixedwoods.....	591,107	4,898	596,005	22
TOTAL.....	841,569	6,601	848,170	31
Immature forest:				
Coniferous.....	145,737	8,430	154,167	6
Hardwood.....	206,683	23,101	229,784	8
Mixedwoods.....	758,967	126,183	885,150	32
TOTAL.....	1,111,387	157,714	1,269,101	46
Young growth:				
Coniferous.....	45,444	4,969	50,413	2
Hardwood.....	109,546	24,573	134,119	5
Mixedwoods.....	224,927	91,088	316,015	11
TOTAL.....	379,917	120,630	500,547	18
Reproducing forest.....	101,811	20,400	122,211	5
TOTAL PRODUCTIVE FOREST.....	2,434,684	305,545	2,740,029	

### Regional Forest Types

The regional distribution of forest types in Ontario is influenced by the lowering in temperature from south to north and a reduction in rainfall and general atmospheric humidity from east to west. The regularity of the response of forest growth to these two variable factors is modified by proximity of large bodies of water, especially the "Great Lakes" system, topography, the distribution of broad soil types and other local conditions. These factors are expressed

in the limits of distribution of certain commercial tree species, and in the volume and growth rate of the forest. Separate volume tables and yield tables are made for each region or section, and they serve as units in the compilation of volume estimates. In the North Bay district the northern limits of the distribution of tolerant hardwoods, maple, yellow

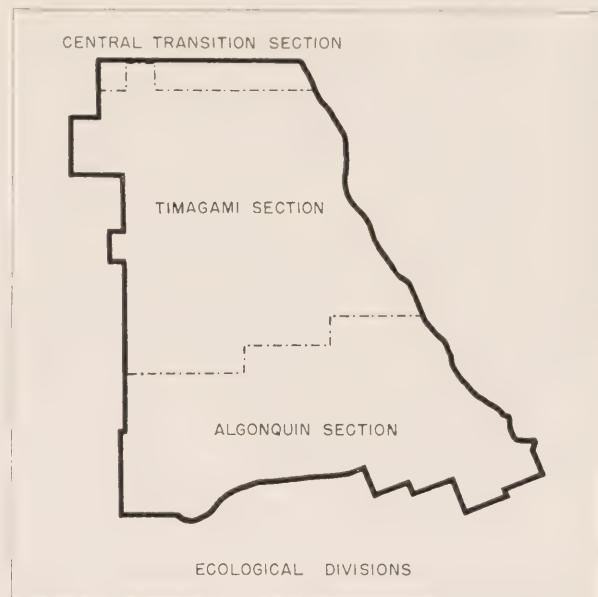


FIGURE 4

birch and others, and white and red pine; in consolidated stands serves to separate the forests of the district into three major sections (fig. 4) as follows:

1. The Algonquin section comprising 40 per cent of the total area occupying the southern portion of the district.

2. The Timagami section taking up the mid-portion of the district comprising 56 per cent of the total area of the district.

3. The Central Transition section covers 4 per cent of the total area and occupies a narrow belt along the northern boundary of the district.

The Algonquin section is characterized by the presence of tolerant hardwoods, maple and yellow birch in consolidated commercial stands on most of the deep-soiled, well-drained sites. These stands originally contained an admixture of white pine. White pine reached its finest individual development as isolated trees in these hardwood stands and was almost all removed in the earlier logging operations. Lack of regeneration of pine has left these stands as virtually pure hardwoods. In more recent years yellow birch and some of the best quality maple



has become commercially valuable for veneer stock and lumber and these stands are being operated a second time. On the lighter sandy soils white and red pine stands prevailed. For the most part these have been cut and as a rule burned over after logging giving rise to large areas of immature poplar and white birch stands with a small admixture of conifers.

The Timagami section is noteworthy for the presence of extensive areas of stands of white and red pine which in the absence of intensive competition from tolerant hardwood components have a tendency to grow in relatively pure stands on all of the well-drained soils. Along with the pine are found the characteristic components of the Boreal forest, black and white spruce, balsam and jack pine.

The Central Transition section, covering only 4 per cent of the area of the district, belongs to the Boreal forest zone. White pine and tolerant hardwoods are represented only by a few scattered outliers. Spruce-fir stands occupy all of the well-drained heavier soils as a mature forest. Jack pine stands, dense and of good development, are found on coarse sand and gravelly soils. Pure stands of black spruce occur everywhere on low, poorly-drained sites, gradually tapering off in growth rate to the open muskegs common in this section. The relatively intolerant poplar and white birch are the only important broadleaved tree species. These are aggressive in taking over logged and burned areas on the well-drained uplands where they also form a component of the mature stands.

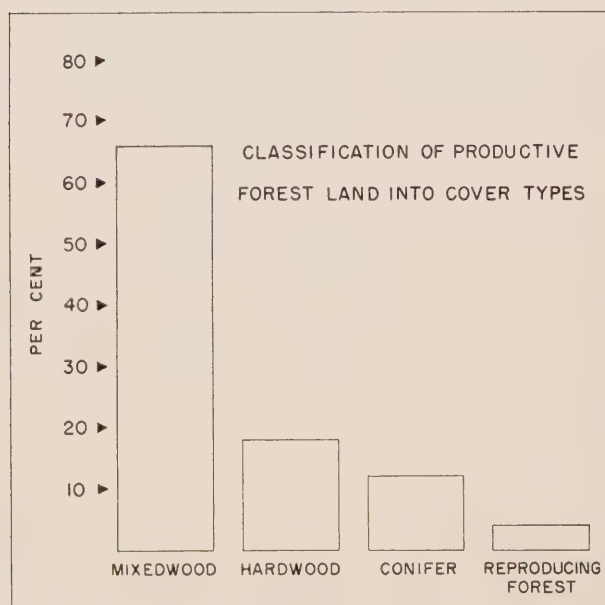


FIGURE 5

## Cover Types

The forests of the North Bay district are made up of some 20 common trees species; 12 species (table 3) make up 98 per cent of the total wood volume. For simplicity the forests are described under three main cover types, coniferous, hardwood and mixedwoods. The coniferous type is composed of 75 per cent or more conifers or softwood trees, the hardwood type contains 75 per cent or more hardwood or broad-leaved trees. All other combinations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts areas of reproducing forests, too recently established to have a sufficiently stable composition to be classified into types. These areas are referred to as — reproducing forests.

Over the district as a whole, the mixedwoods type predominates, occupying 66 per cent of the productive forest area. The hardwood type occupies 18 per cent and the coniferous type, the smallest area, 12 per cent. Four per cent is reproducing forest (fig. 5).

The distribution of cover types for Crown lands is very similar to that of the total productive forest with: 65 per cent mixedwoods, 18 per cent hardwoods, 13 per cent coniferous and 4 per cent reproducing forest. However, the patented lands show: 73 per cent mixedwoods, 16 per cent hardwood, 5 per cent coniferous and 6 per cent reproducing forest.

TABLE 3. — *Percentage of the primary growing stock on productive forest lands in the North Bay district in mature and second growth stands, by species.*

Species	Mature age class	Immature age class	Productive forest
	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
White pine.....	16.1	8.8	12.7
Red pine.....	8.0	3.0	5.6
Jack pine.....	4.1	6.8	5.4
White spruce.....	6.1	7.1	6.6
Black spruce.....	3.8	6.5	5.0
Balsam fir.....	3.1	4.2	3.6
Hemlock.....	4.0	2.6	3.3
Cedar.....	6.0	3.9	5.0
<b>TOTAL CONIFERS.....</b>	<b>51.2</b>	<b>42.9</b>	<b>47.2</b>
Hard maple.....	8.1	2.1	5.3
Yellow birch.....	13.5	3.2	8.7
White birch.....	16.0	24.4	19.9
Poplar.....	9.5	25.2	16.9
Other hardwoods.....	1.7	2.2	2.0
<b>TOTAL HARDWOOD.....</b>	<b>48.8</b>	<b>57.1</b>	<b>52.8</b>

## Volume

The volume of the primary growing stock includes all live trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the North Bay district is just under 4 billion cubic feet (3,992,238,000 cubic feet). This is an average of 1,457 cubic feet per acre (table 4). The mature age class contains 2.1 billion cubic feet

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average total
	4"-9" d.b.h.	10"+ d.b.h.	Average	4"-9" d.b.h.	10"+ d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Mature.....	711	1787	2498	557	2152	2709	2499
Immature.....	945	520	1465	1036	510	1546	1475
Productive forest.....	677	855	1532	547	310	857	1457

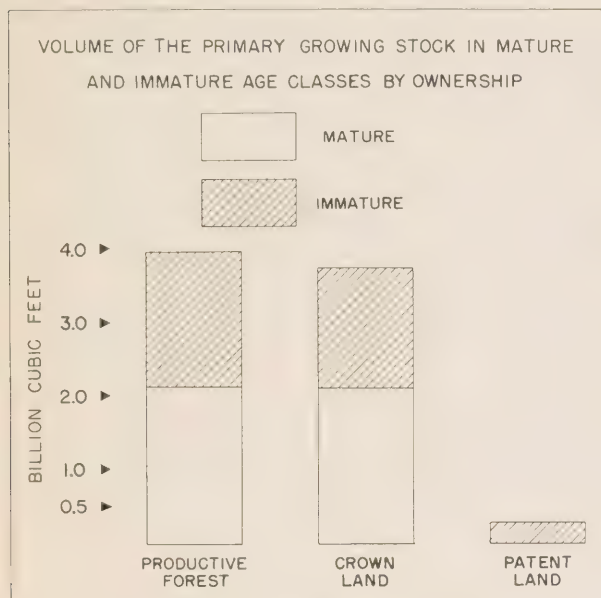


FIGURE 6

(table 5) or 2,499 cubic feet per acre, while the immature age class contains 1.9 billion cubic feet or 1,475 cubic feet per acre (fig. 6).

The volume of the primary growing stock on Crown lands in the North Bay district is 3,730 million cubic feet (table 6) or an average of 1,532 cubic feet per acre. The mature age class contains 2,102 million cubic feet or 2,498 cubic feet per acre. The figures for Crown lands are just about the same as for the productive forest due to a negligible amount of mature timber on patented lands (fig. 6). The immature age class on Crown lands contains 1,629 million cubic feet or 1,465 cubic feet per acre.

Patented lands in the North Bay district have an area of 305,345 acres or 11 per cent of the total productive forest area. They contain a total of 262 million cubic feet or 857 cubic feet per acre (table 7). The mature age class, occupying 6,601 acres, contains 18 million cubic feet or 2,709 cubic feet per acre. The immature age class contains 244 million cubic feet or 1,546 cubic feet per acre.



*White pine being scaled by Departmental scalers.*



### Conifers vs. Hardwoods

The volume of the primary growing stock is about equally divided between the two species groups conifers and hardwoods, with 1,888 million cubic feet or 47.3 per cent of the growing stock made up of conifers and 2,104 million cubic feet or 52.7 per cent comprising the hardwood content (table 8). In the mature age class conifers just about equal the hardwoods in volume with 1,083 million cubic feet of conifers and 1,036 million cubic feet of hardwoods. In the immature age class, hardwoods with 1,067 million cubic feet exceed the conifers with 805 million cubic feet. Since the intolerant hardwoods, poplar and white birch are faster growing than many of the conifers, especially during younger ages, it appears that the total softwood content of the forest is not noticeably declining.

The principal species on Crown land making up the two groups, conifers and hardwoods are shown in figure 7. Conifers comprise six species — three pines, white, red and jack pine; two spruces white and black; and balsam-fir. The principal hardwoods consist of four species, two species usually classed as tolerant hardwoods, maple and yellow birch and two intolerant species groups, white birch and poplar. Poplar is made up of three main species of which aspen is the most important in volume, followed by balsam poplar and large-toothed aspen.

The most striking and certainly economically the most important feature brought out by a species analysis of the mature and immature age classes

on Crown land is the reduction of red and white pine in the growing stock in the immature age class. Together these two species have a growing stock of 700 million cubic feet, of this 509 million cubic feet are in the mature age class and 192 million cubic feet in the immature age class. In the mature class they form 14 per cent of the total growing stock, in the immature class only about 5 per cent. The prominent place of red and white pine in the mature forest is being taken in the immature by an increase in jack pine and black spruce and a very large increase in poplar and white birch.



*By using a special instrument known as a stereoscope, aerial photographs can be viewed in three dimensions.*

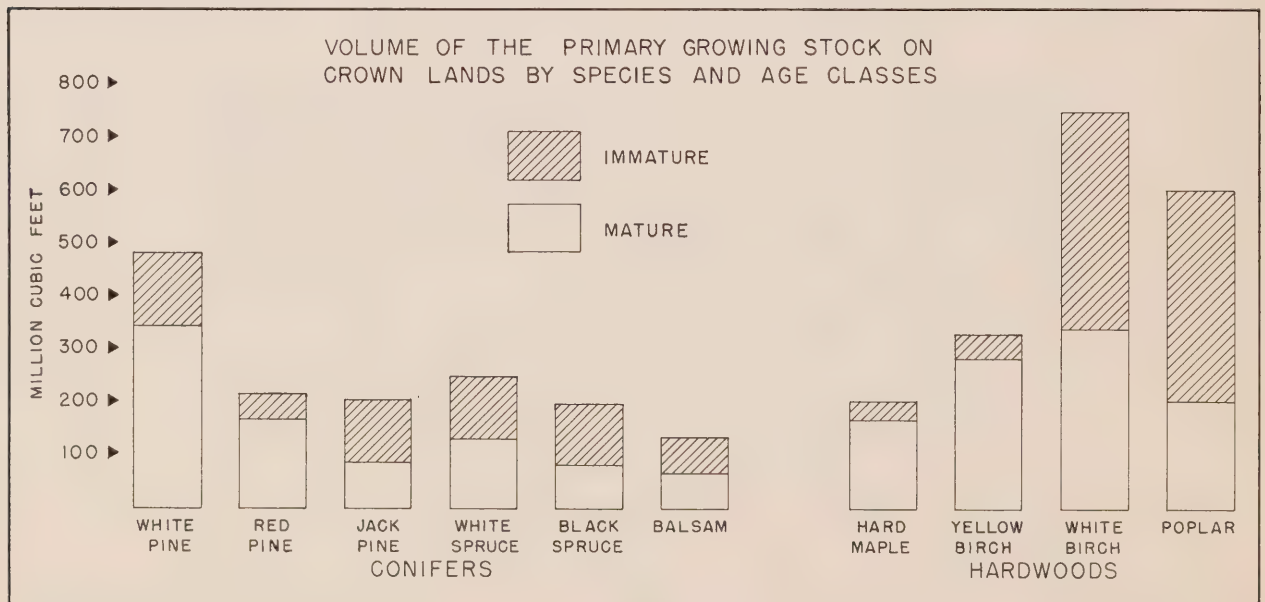


FIGURE 7



### Sawlogs vs. Pulpwood

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as pulpwood and cordwood material depending on species, although poles, railway ties, and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for sawlogs, and other uses where larger timber is required. A tree 10 inches d.b.h. outside bark will on the average give one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition there is residual smaller size material in the top, which may be used as pulp-

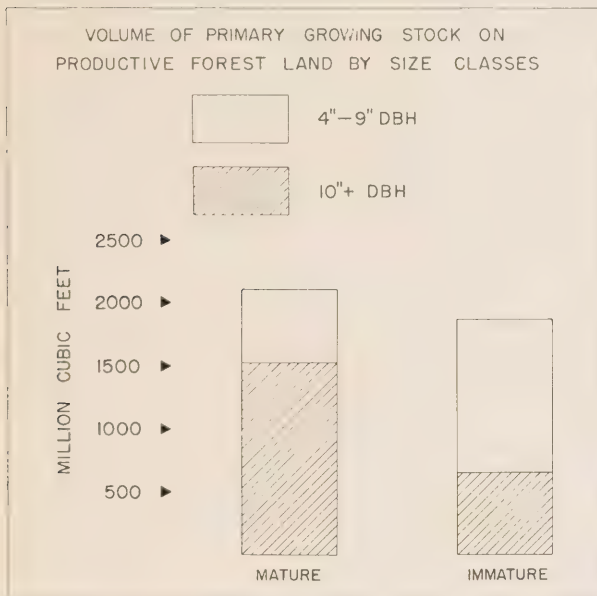


FIGURE 8

wood or for purposes other than saw timber. The quantity in this residual top is relatively small and is included in the 10 inches and over material in all inventory estimates. It has not been the practice to utilize the tops of trees cut in sawlog operations in the North Bay district for pulpwood. The use of present forest and mill waste, however, is increasing and the future may see a much larger proportion of the primary growing stock come into economic use.

Of the volume of the primary growing stock on productive forest lands, 1,816 million cubic feet are in the 4-9 inch d.b.h. size class, and 2,176 million cubic feet in the 10 inch d.b.h. class and over (table 8). For both species groups and for the productive forest area as a whole the volume in sawlogs slightly exceeds the volume in the cordwood size class.

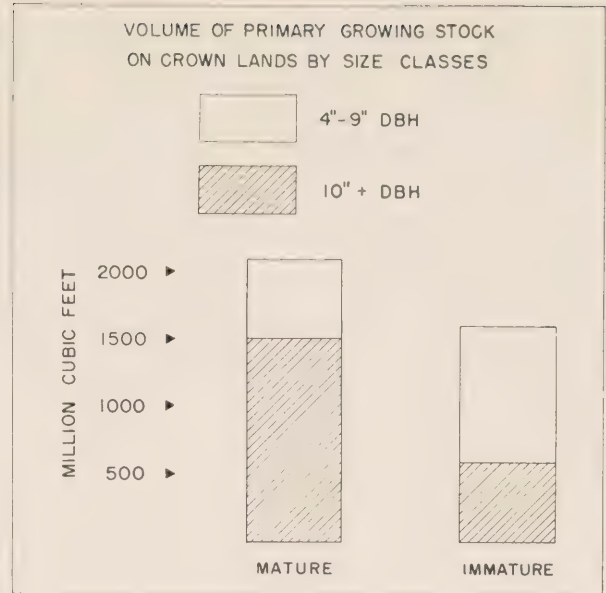


FIGURE 9

In the mature age class the volume in the size class 10 inches d.b.h. and over amounting to 1,518 million cubic feet is two-and-one-half times the volume in the 4-9 inch class with 602 million cubic feet (fig. 8). This relationship holds also when conifers and hardwoods are compared separately (table 8).

The immature age class gives the reverse relationship with nearly twice the volume in the 4-9 inch d.b.h. class as compared with the volume in the 10 inch and over class.

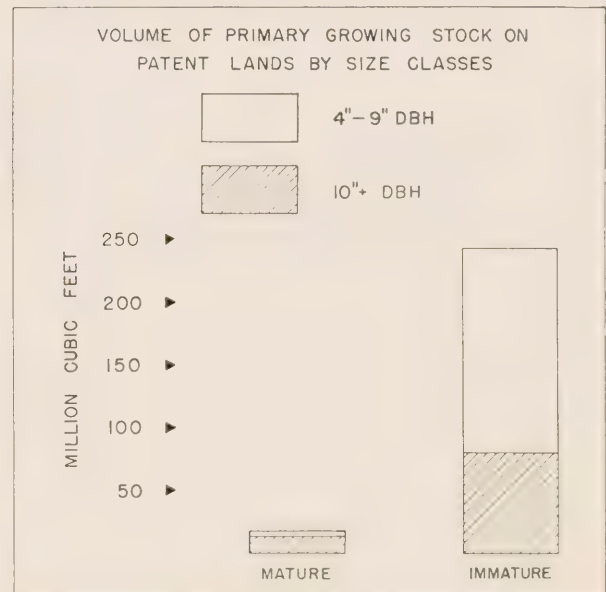


FIGURE 10

An analysis of relationship of the two size classes for Crown lands (table 9), and for patented lands (table 10) shows a marked consistency in the relationship between the volume in the two size classes with that for the area as a whole. However, the fairly consistent relationship between the two size classes as far as the total figures are concerned does not hold for the species when considered separately.

The volume relationship of the two size classes 4-9 inches d.b.h. and 10 inches and over for the principal species in mature and immature forest is shown in figure 11 for conifers, and figure 12 for hardwoods which graphically represent table 9, for Crown lands. White and red pine in the mature

forest is nearly all in the sawlog size class. In the immature age class about one half of the volume is ten inches d.b.h. and over. Jack pine has nearly one-half its volume of sawlog size in the mature age class and one-third in the 10 inch and over d.b.h. size class in the immature forest. White spruce has considerably more than one-half its volume in the sawlog size in the mature forest and about one-third in the immature forest. Black spruce and balsam-fir produce a very small proportion of sawlog material.

The size relationships of the main hardwood species are shown in figure 12. White birch which is about equal to poplar in volume in the immature stands is more persistent than poplar and occupies a much

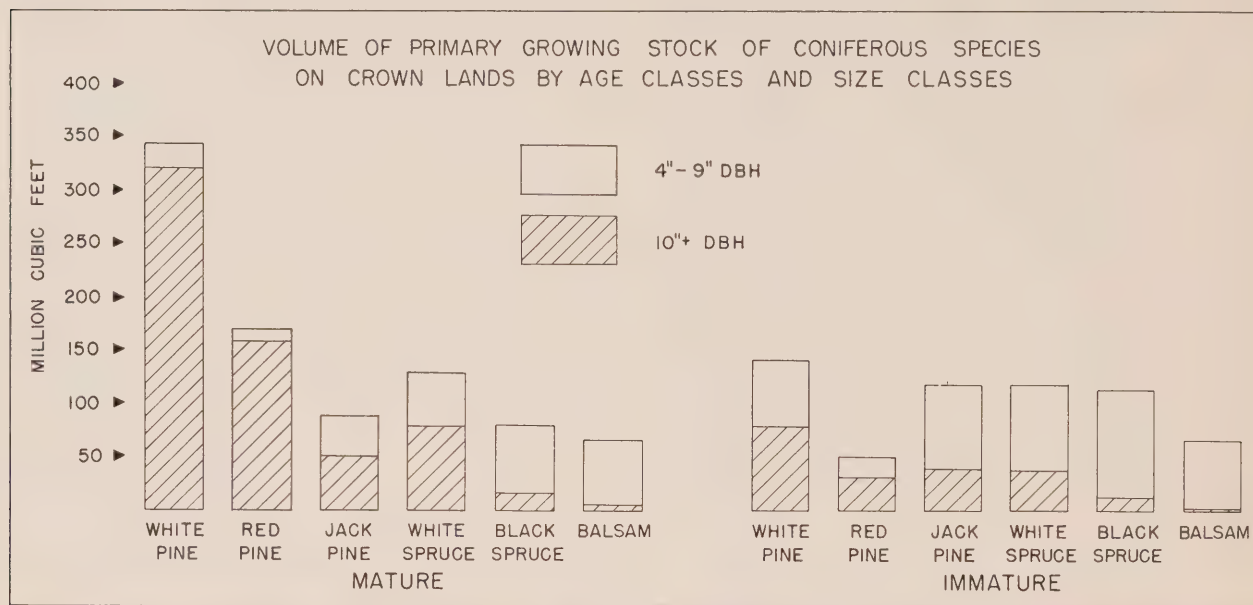


FIGURE 11



*A log boom stretched across an Ontario river.*



*Survey work in progress.*



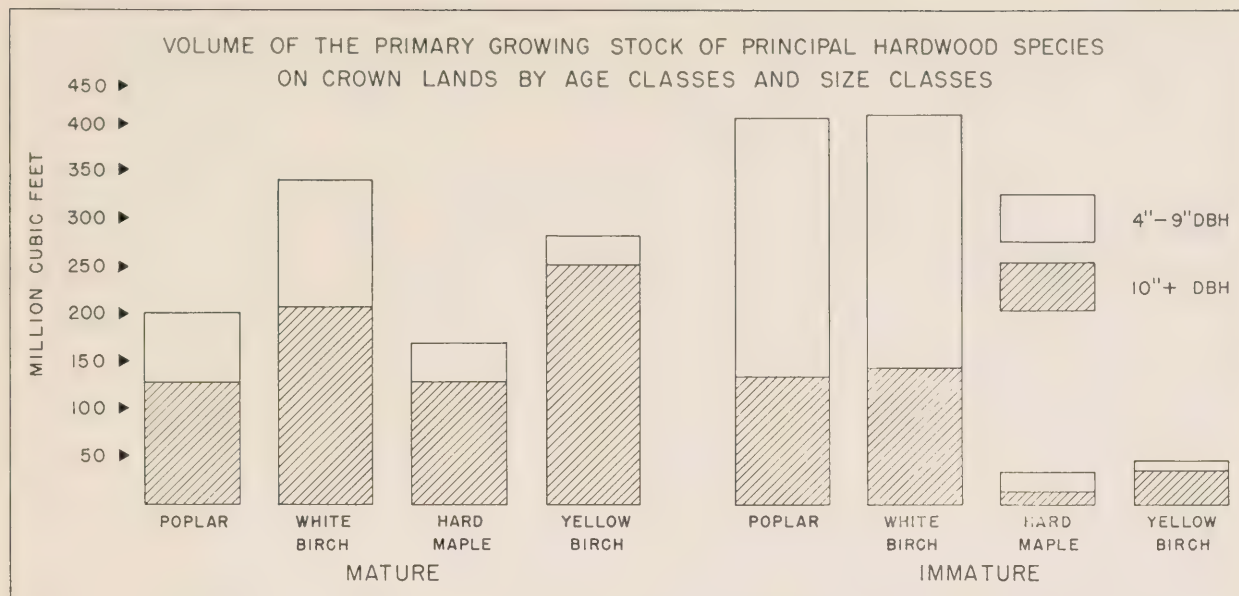


FIGURE 12

more important position in the mature forest. In the mature forest two-thirds of the volume of poplar and white birch is in the larger size class which is reduced to one-third in the immature age class. The volume of the tolerant hardwoods in the mature forest is almost wholly in the sawlog size class, while the total volume and area in the immature age class is too small to give significant figures.

The area of mature forest on patented lands is negligible but since these lands are readily accessible by roads they have been operated very intensively

and even fuelwood in some sections is readily marketable (table 10, fig. 13). The proportion of conifers to hardwoods is less than in Crown lands, and poplar and white birch are somewhat higher. It is also noticeable that the sizes are considerably smaller in the patented lands generally. Poplar and white birch which have one-third of their volume in the 10 inch and over size class on Crown lands have this reduced to one-quarter on patented lands. Patented lands are therefore producing very little timber of sawlog size.

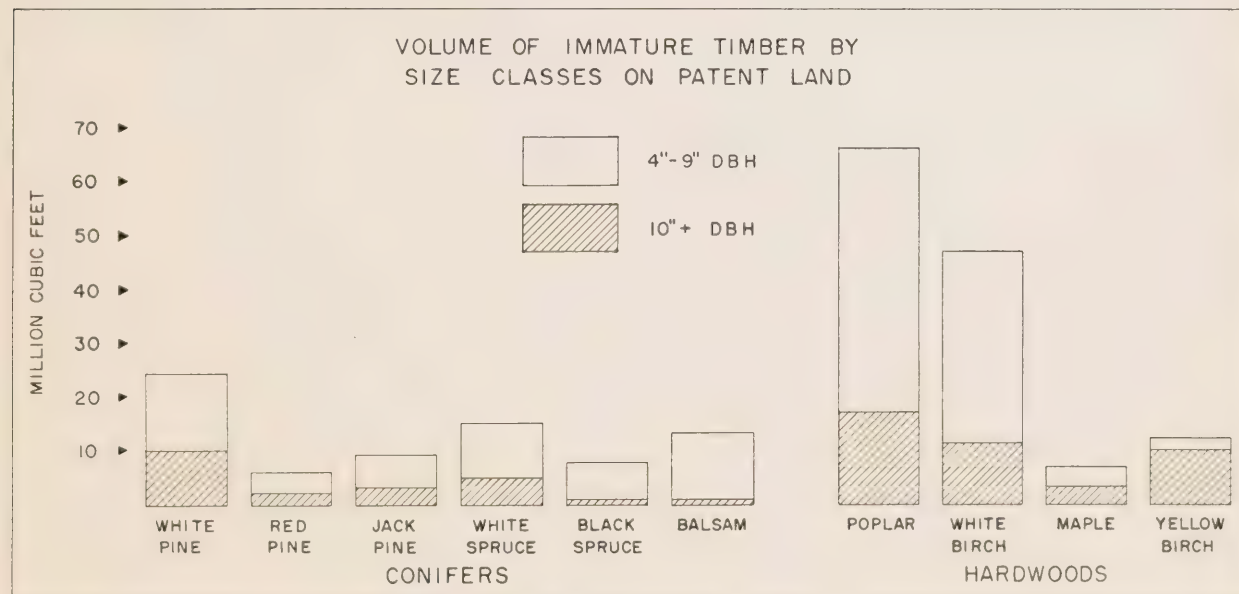


FIGURE 13



TABLE 5. — Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the North Bay district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	110,842	398,426	156,493	55,751	721,512
Hardwood.....	70,118	250,424	235,757	111,379	667,678
Mixedwoods.....	420,936	869,055	821,736	491,321	2,603,048
TOTAL.....	601,896	1,517,905	1,213,986	658,451	3,992,238

TABLE 6. — Cubic-foot volumes of primary growing stock on Crown land in the North Bay district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	110,380	397,400	147,995	51,752	707,527
Hardwood.....	69,537	247,783	210,697	102,648	630,665
Mixedwoods.....	418,303	858,518	691,842	423,664	2,392,327
TOTAL.....	598,220	1,503,701	1,050,534	578,064	3,730,519

ALL CONIFERS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	99,831	378,840	145,218	45,869	669,758
Hardwood.....	11,050	15,380	19,603	16,472	62,505
Mixedwoods.....	197,282	381,117	358,431	219,391	1,156,221
TOTAL.....	308,163	775,337	523,252	281,732	1,888,484

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	99,414	377,915	137,532	42,591	657,452
Hardwood.....	10,996	15,274	18,263	15,044	59,577
Mixedwoods.....	196,015	377,061	301,900	189,243	1,064,219
TOTAL.....	306,425	770,250	457,695	246,878	1,781,248

ALL HARDWOODS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	11,011	19,586	11,275	9,882	51,754
Hardwood.....	59,068	235,044	216,153	94,907	605,172
Mixedwoods.....	223,654	487,938	463,306	271,930	1,446,828
TOTAL.....	293,733	742,568	690,734	376,719	2,103,754

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	10,966	19,485	10,463	9,161	50,075
Hardwood.....	58,541	232,509	192,434	87,604	571,088
Mixedwoods.....	222,288	481,457	389,942	234,421	1,328,108
TOTAL.....	291,795	733,451	592,839	331,186	1,949,271

TABLE 7.—Cubic-foot volumes of primary growing stock on patented land in the North Bay district by species groups, age class and cover type in two size classes.

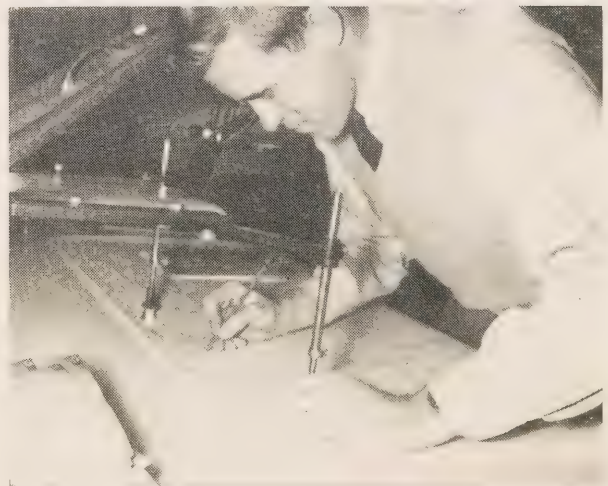
ALL SPECIES					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	462	1,026	8,498	3,999	13,985
Hardwood.....	581	2,641	25,060	8,731	37,013
Mixedwoods.....	2,633	10,537	129,894	67,657	210,721
TOTAL.....	3,676	14,204	163,452	80,387	261,719

ALL CONIFERS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	417	925	7,686	3,278	12,306
Hardwood.....	54	106	1,340	1,428	2,928
Mixedwoods.....	1,267	4,056	56,531	30,148	92,002
TOTAL.....	1,738	5,087	65,557	34,854	107,236

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	45	101	812	721	1,679
Hardwood.....	527	2,535	23,719	7,353	34,084
Mixedwoods.....	1,366	6,481	73,364	37,509	118,720
TOTAL.....	1,938	9,117	97,895	45,533	154,483

TABLE 8.—Cubic-foot volumes of primary growing stock on productive forest land in the North Bay district by species and age classes in two size classes.

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine	20,995	320,956	76,938	88,334	507,223
Red pine	11,826	157,023	22,081	33,703	224,633
Jack pine...	36,786	50,571	85,336	41,577	214,270
White spruce	50,769	78,223	90,738	42,718	262,448
Black spruce	62,837	16,668	106,211	14,703	200,419
Balsam fir.	60,031	5,573	76,268	2,851	144,723
Hemlock	14,827	69,696	24,151	24,164	132,838
White cedar ..	50,092	76,627	39,982	33,658	200,359
Larch			1,547	24	1,571
TOTAL CONIFERS	308,163	775,337	523,252	281,732	1,888,484
Hard maple	42,055	129,235	23,981	16,017	211,288
Yellow birch	31,946	254,835	13,087	46,034	345,902
Beech			432	323	755
White elm	422	4,281			4,703
Ironwood	1,785	276	1,689	169	3,919
Red oak	115	930	5,360	1,392	7,797
Other tolerants	2,137		1,391		3,528
White birch	130,911	208,582	301,701	154,480	795,674
Poplar (all)...	73,334	128,733	322,104	149,543	673,714
Red maple ..	3,098	2,737	11,468	2,353	19,656
Ash (white and black)	7,277	9,172	9,358	6,151	31,958
Basswood .....	653	3,787	163	257	4,860
TOTAL HARDWOODS	293,733	742,568	690,734	376,719	2,103,754
TOTAL ALL SPECIES..	601,896	1,517,905	1,213,986	658,451	3,992,238



This man is shown transferring data from a photograph to a work sheet. He is using a sketchmaster especially designed for the task.

TABLE 9. — *Cubic-foot volumes of primary growing stock on Crown land in the North Bay district by species and age class in two size classes.*

Species	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousana</i> cu. ft.	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.
White pine.....	20,947	320,156	62,951	77,853	481,907
Red pine.....	11,804	156,667	18,703	31,117	218,291
Jack pine.....	36,636	50,434	79,461	38,706	205,237
White spruce.....	50,604	77,772	80,262	37,718	246,356
Black spruce.....	62,696	16,612	99,259	13,870	192,437
Balsam fir.....	59,671	5,489	63,958	2,322	131,440
Hemlock.....	14,320	67,269	17,272	17,272	116,133
White cedar.....	49,747	75,851	34,338	27,997	187,933
Larch.....			1,491	23	1,514
<b>TOTAL CONIFERS.....</b>	<b>306,425</b>	<b>770,250</b>	<b>457,695</b>	<b>246,878</b>	<b>1,781,248</b>
Hard maple.....	41,483	126,961	20,612	12,650	201,706
Yellow birch.....	31,618	250,432	10,629	35,744	328,423
Beech.....			362	271	633
White elm.....	415	4,206			4,621
Ironwood.....	1,743	270	1,301	125	3,439
Red oak.....	113	914	3,906	1,022	5,955
Other tolerants.....	2,137		1,391		3,528
White birch.....	130,548	207,362	265,678	143,260	746,848
Poplar (all).....	72,966	127,974	273,312	131,651	605,903
Red maple.....	3,003	2,648	8,271	1,706	15,628
Ash (white and black).....	7,133	9,010	7,240	4,542	27,925
Basswood.....	636	3,674	137	215	4,662
<b>TOTAL HARDWOODS</b>	<b>291,795</b>	<b>733,451</b>	<b>592,839</b>	<b>331,186</b>	<b>1,949,271</b>
<b>TOTAL ALL SPECIES</b>	<b>598,220</b>	<b>1,503,701</b>	<b>1,050,534</b>	<b>578,064</b>	<b>3,730,519</b>

TABLE 10. — *Cubic-foot volumes of primary growing stock on patented land in the North Bay district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.	<i>Thousand</i> cu. ft.
White pine.....	48	800	13,987	10,481	25,316
Red pine.....	22	356	3,378	2,586	6,342
Jack pine.....	150	137	5,875	2,871	9,033
White spruce.....	165	451	10,476	5,000	16,092
Black spruce.....	141	56	6,952	833	7,982
Balsam fir.....	360	84	12,310	529	13,283
Hemlock.....	507	2,427	6,879	6,892	16,705
White cedar.....	345	776	5,644	5,661	12,426
Larch.....			56	1	57
<b>TOTAL CONIFERS.....</b>	<b>1,738</b>	<b>5,087</b>	<b>65,557</b>	<b>34,854</b>	<b>107,236</b>
Hard maple.....	572	2,274	3,369	3,367	9,582
Yellow birch.....	328	4,403	2,458	10,290	17,479
Beech.....			70	52	122
White elm.....	7	75			82
Ironwood.....	42	6	388	44	480
Red oak.....	2	16	1,454	370	1,842
White birch.....	363	1,220	36,023	11,220	48,826
Poplar (all).....	368	759	48,792	17,892	67,811
Red maple.....	95	89	3,197	647	4,028
Ash (white and black).....	144	162	2,118	1,609	4,033
Basswood.....	17	113	26	42	198
<b>TOTAL HARDWOODS.</b>	<b>1,938</b>	<b>9,117</b>	<b>97,895</b>	<b>45,533</b>	<b>154,483</b>
<b>TOTAL ALL SPECIES</b>	<b>3,676</b>	<b>14,204</b>	<b>163,452</b>	<b>80,387</b>	<b>261,719</b>



*A saw mill in the Ontario north country.*

### *Allowable Cut*

The calculations of the allowable cut have been carried out for each species by means of a volume formula<sup>1</sup> using an appropriate rotation<sup>2</sup>. The amount of the annual allowable cut results directly from the volume of the primary growing stock and rotation age used for the different species encountered in the district. The present allowable cut figures like the volume of the primary growing stock may be on areas which, at the moment, are inaccessible to operations. The allowable cut volumes may likewise be in stands which due to low net yield are economically inoperable. Taking these conditions into account, the computed allowable cut is regarded as potential, rather than actually obtainable under present operating conditions.

Woods operations are being carried on each year and with present stands growing older, the size and

<sup>1</sup> Methods of calculation of allowable cut are given in Appendix, — allowable cut, page 27.

<sup>2</sup> Rotation ages by species table 16, page 27.



structure of the primary growing stock will change. The calculation of the allowable cut based on the present volume of the primary growing stock is of value for a period of about ten years. On expiration of the initial ten year period the allowable cut should be calculated anew, based on the experience of the first ten year period and in conformity with the actual performance of the forest. With effective forestry practices allowable cuts for the more valuable species will tend, almost certainly, to increase; without improved forestry practices the present trend to more and more poplar and white birch at the expense of the pines will continue.

cubic feet per annum, per acre of the productive forest area. Of the total allowable cut, 30,916,800 cubic feet or 39 per cent is coniferous species and 47,511,400 cubic feet or 61 per cent is of hardwood species. Since the rotation age is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.7 per cent of the primary growing stock and 2.4 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 37 per cent is white and red pine, 21 per cent jack pine, 25 per cent white and black spruce, 9 per cent balsam and 8 per cent other conifers. The relationship of

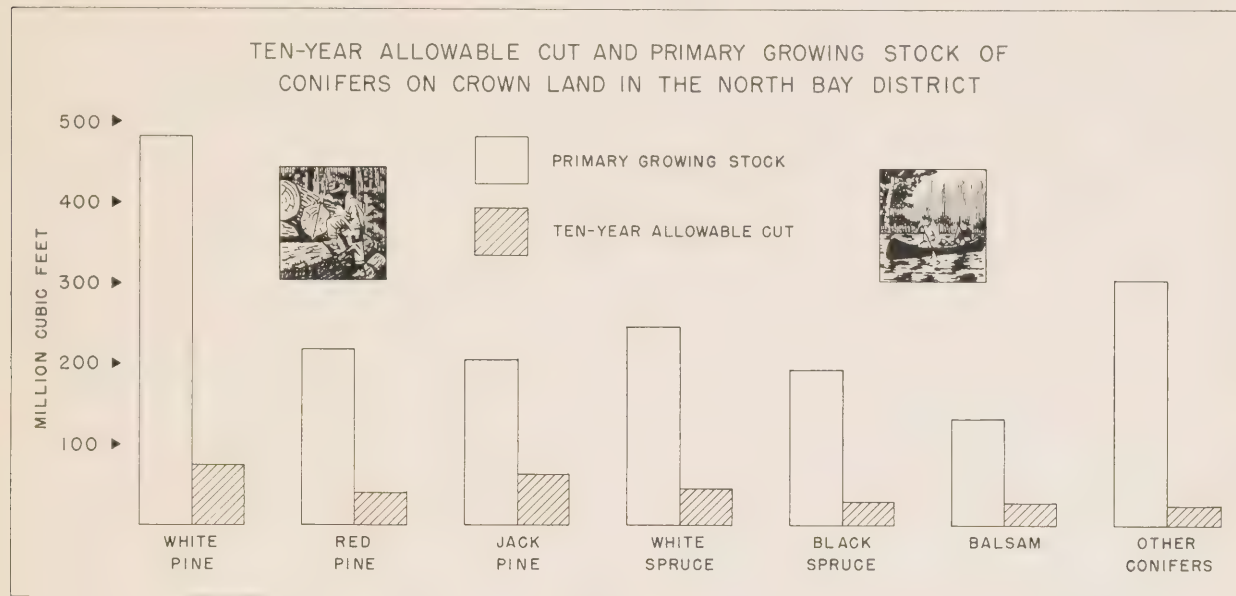


FIGURE 14

Patented lands in the district contain very little mature timber. These lands are for the most part readily accessible by roads and have a local market for small size material. They are now being operated on a short rotation and are producing very little sawlog size material. This condition has been taken into consideration and the allowable cut for patented land has been calculated on a much shorter rotation than for Crown lands of the district.

The annual allowable cut, or net depletion allowable under management in the North Bay district is 87,657,600 cubic feet, 78,428,200 cubic feet from Crown lands and 9,229,400 cubic feet from patented lands. Of the total allowable cut, 90 per cent is on Crown lands and 10 per cent on patented lands.

#### CROWN LAND

The annual allowable cut for Crown land represents 2.10 per cent of the primary growing stock or 32.2

the allowable cut for a ten year period to the volume of the primary growing stock by species is shown graphically, figure 14.

The species making up the hardwood content (table 12) shows that almost 48 per cent is poplar and another 37 per cent is white birch, which means that only 15 per cent of the allowable cut is left for other hardwood species, of which yellow birch and hard maple are the most important. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 15.

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 9,229,400 cubic feet, which represents 3.5 per cent of the primary growing stock, or 30.2

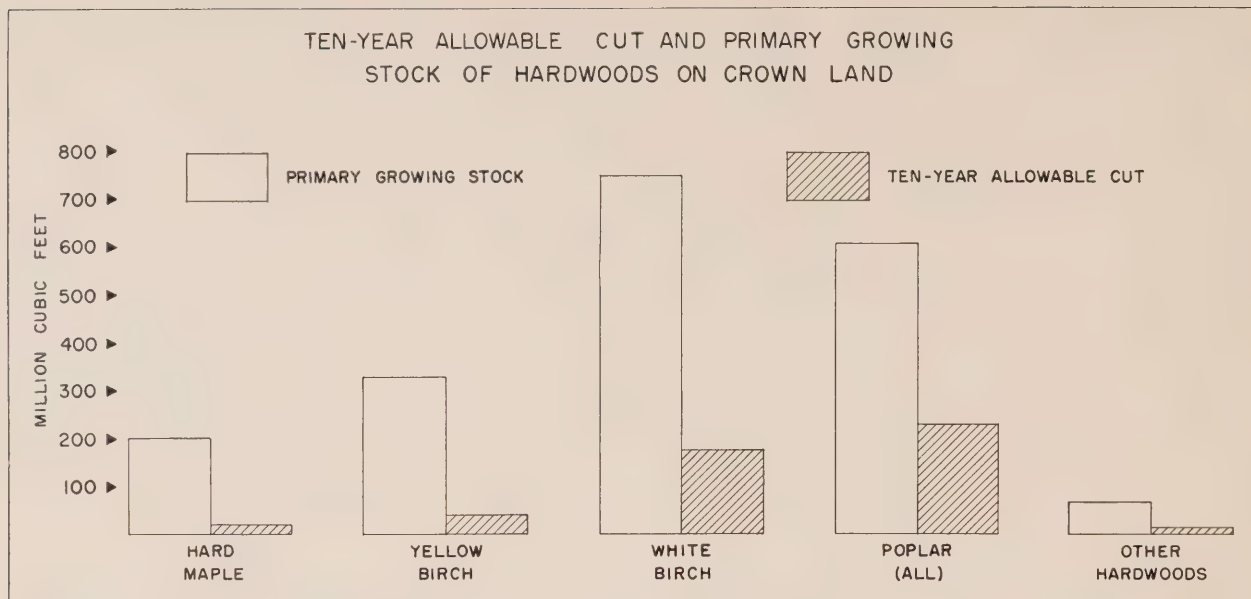


FIGURE 15

cubic feet per annum, per acre of the productive forest land. The annual allowable cut on patented lands is 2.5 per cent of the primary growing stock for conifers and 4.2 per cent for hardwoods. The justification for cutting annually over four per cent of the primary growing stock of hardwoods is to be found in the very short rotation of thirty years on which it is proposed to manage the large areas of poplar stands.

The annual allowable cut for coniferous species on patented lands is 2,676,500 cubic feet and for hard-

woods 6,552,900 cubic feet. Considerably over one-half of the allowable cut is for the two intolerant hardwood species poplar and white birch which together contribute 5,764,000 cubic feet to the total allowable cut. For the coniferous species, white pine, jack pine and white spruce are the most important, each contributing about 500,000 cubic feet to the total allowable cut. Balsam fir is next in importance followed by white cedar, hemlock, red pine and black spruce (figs. 16 and 17).

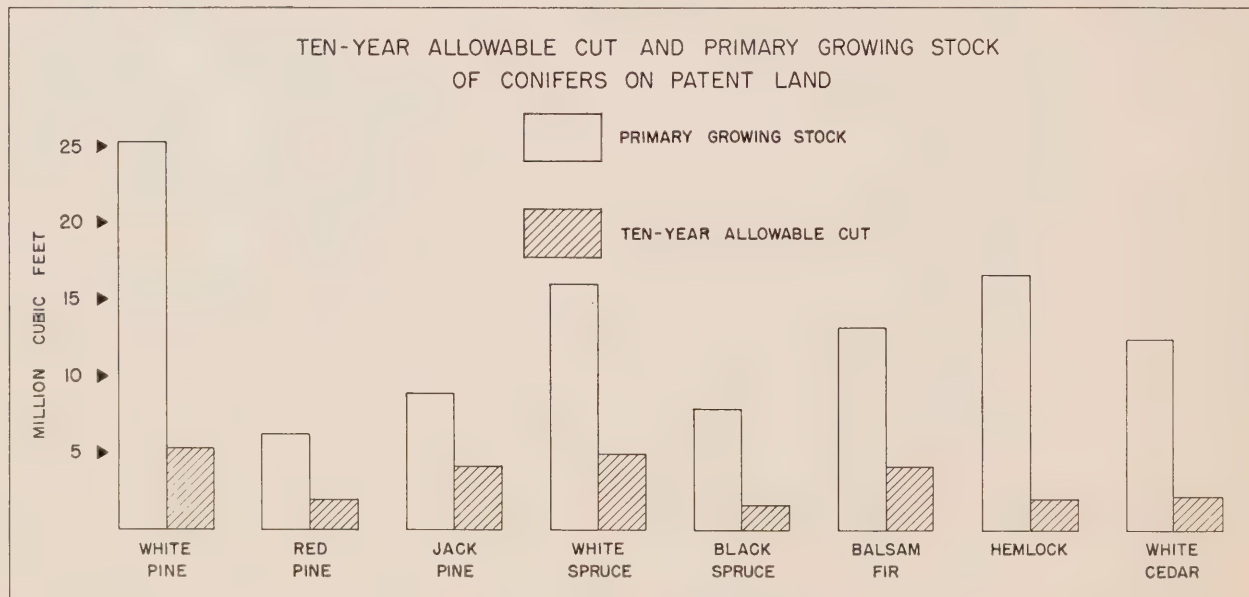


FIGURE 16

# TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENT LAND

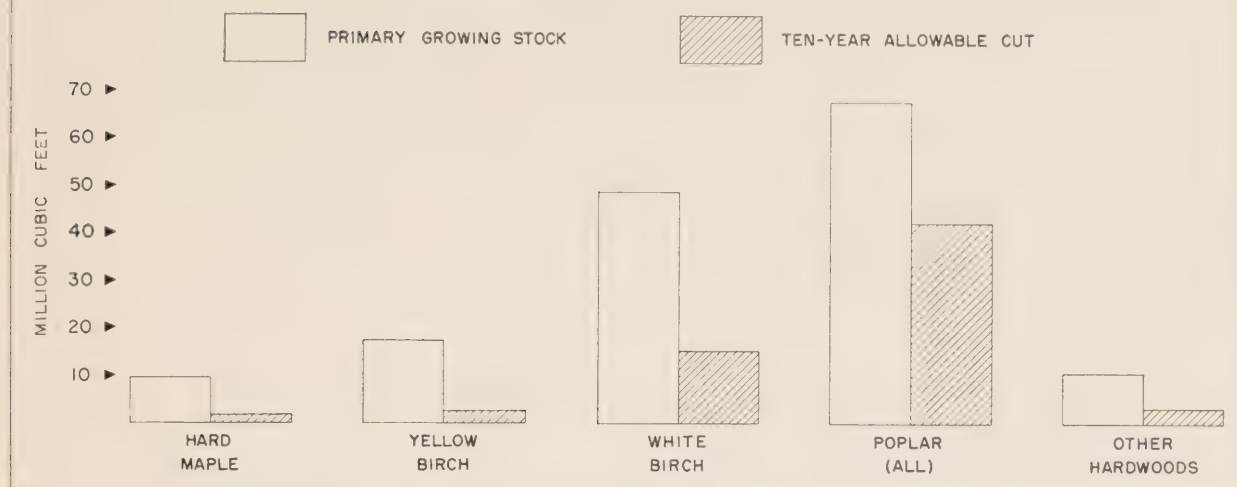


FIGURE 17

TABLE 11.—*Annual allowable cut for coniferous species on Crown lands in the North Bay district.*

Species	Annual allowable cut <i>cu. ft.</i>
White pine.....	7,529,800
Red pine.....	4,093,000
Jack pine.....	6,413,600
White spruce.....	4,619,200
Black spruce.....	3,006,800
Balsam fir.....	2,738,300
Hemlock.....	725,800
White cedar.....	1,761,900
Larch.....	28,400
<b>TOTAL CONIFERS</b>	<b>30,916,800</b>

TABLE 12.—*Annual allowable cut for hardwood species on Crown land.*

Species	Annual allowable cut <i>cu. ft.</i>
Hard maple.....	1,891,000
Yellow birch.....	4,105,300
Beech.....	5,900
White elm.....	57,800
Ironwood.....	64,500
Red oak.....	55,800
Other tolerants.....	66,200
White birch.....	17,504,200
Poplar.....	22,721,400
Red maple.....	418,600
Ash.....	523,600
Basswood.....	97,100
<b>TOTAL HARDWOODS</b>	<b>47,511,400</b>

TABLE 13.—*Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut <i>cu. ft.</i>
White pine.....	527,400
Red pine.....	198,200
Jack pine.....	423,400
White spruce.....	502,900
Black spruce.....	166,300
Balsam fir.....	415,100
Hemlock.....	208,800
White cedar.....	233,000
Larch.....	1,400
<b>TOTAL CONIFERS</b>	<b>2,676,500</b>
Hard maple.....	179,700
Yellow birch.....	273,100
Beech.....	1,500
White elm.....	1,600
Ironwood.....	9,000
Red oak.....	34,500
White birch.....	1,525,800
Poplar.....	4,238,200
Red maple.....	188,800
Ash.....	94,500
Basswood.....	6,200
<b>TOTAL HARDWOODS</b>	<b>6,552,900</b>

## Utilization vs. Allowable Cut

According to the Classification of Annual Timber Return for the year ending March 31, 1949<sup>1</sup>, wood and forest products were cut on Crown lands in the North Bay district as follows:

<sup>1</sup> Report of the Minister of Lands and Forests for the Province of Ontario for the fiscal year ending March 31, 1950.



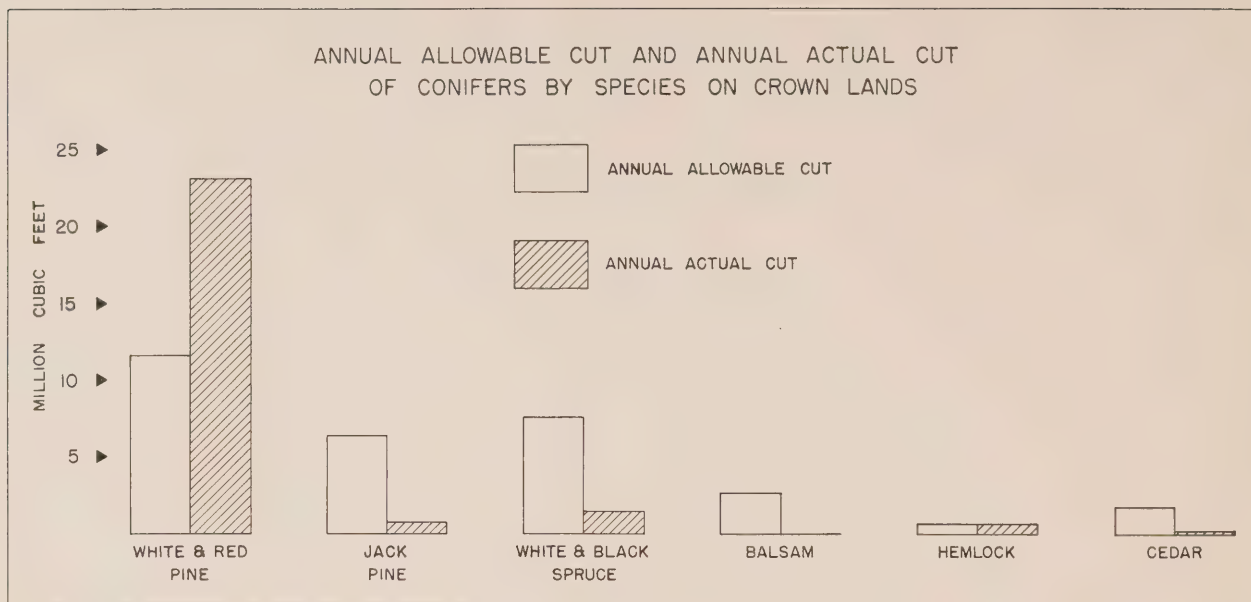


FIGURE 18

Pine, white and red.....	60,644,007 F.B.M. Doyle rule
Other species .....	7,532,456 F.B.M. Doyle rule
Piling.....	164,581 cubic feet
Piling.....	160 lineal feet
Poles and posts.....	3,061 pieces
Ties.....	7,697 pieces
Pulpwood.....	13,759 cords
Fuelwood.....	11,145 cords

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet and are comparable with the figures for allowable cut (table 14).

A comparison of the annual allowable cut with the actual cut by species (table 15) indicates that the two

pinces, red and white, were cut at a rate more than double that permitted under sustained yield regulations. If white and red pine continue to be utilized at these rates the present mature timber stands will be exhausted within less than twenty years. At the end of that period white and red pine would come for the most part from immature stands, and the allowable cut may then drop to 3,780,000 cubic feet or to about eight million feet board measure. The utilization of other conifers, except hemlock, was less than the allowable cut (fig. 18).

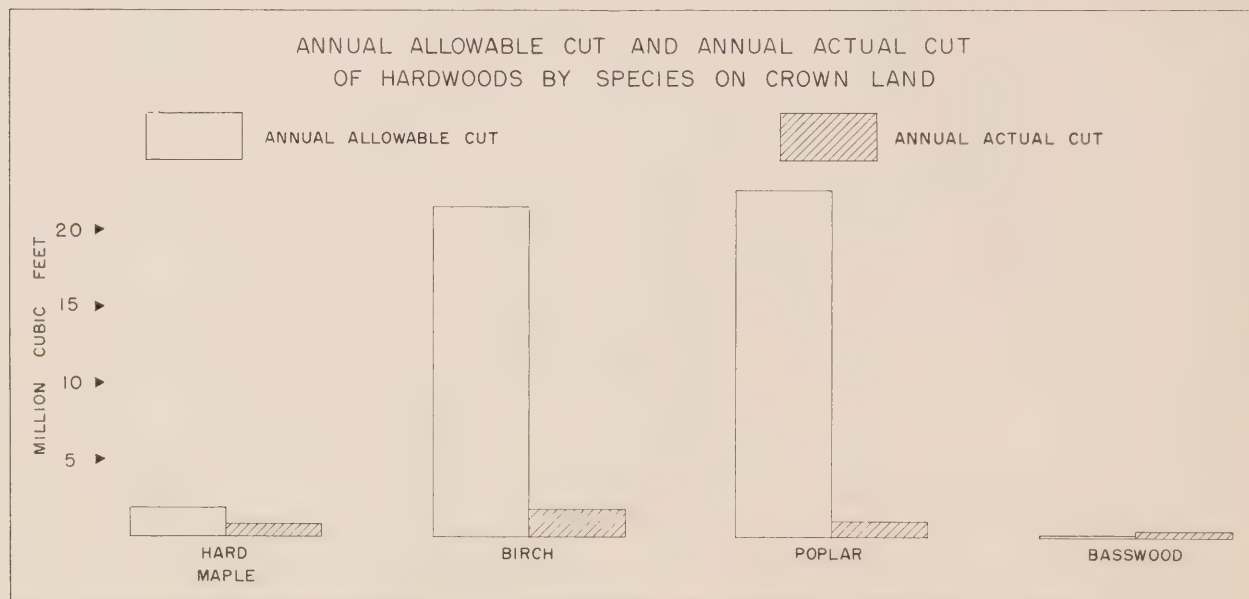


FIGURE 19

The hardwood species were not extensively utilized in the North Bay district with only 4,120 thousand cubic feet utilized out of a total allowable cut of 47,511,000 cubic feet (table 15). While the cut of conifers was 85 per cent of the allowable cut, only 9 per cent of the allowable cut for hardwood species was utilized. Excessive volumes of poplar and white

birch remain unutilized on Crown lands in the North Bay district (fig. 19).

There are no available records of the quantity of timber utilized from patented lands in the North Bay district, but the condition of the growing stock on these lands indicates extensive overcutting of the main merchantable species.

TABLE 14. — *Gross total cubic volume of wood utilized annually in the North Bay district.*

Species	Wood utilized	Total
	cu. ft.	per cent
Pine, white and red.....	23,058,293	76.2
Jack pine.....	825,265	2.7
Spruce, white and black.....	1,497,305	5.0
Balsam fir.....	700	
Hemlock.....	721,560	2.4
Cedar.....	19,600	0.1
<b>TOTAL CONIFERS.....</b>	<b>26,122,723</b>	<b>86.4</b>
Hard maple.....	835,678	2.7
Birch.....	1,838,623	6.1
Poplar.....	1,024,544	3.4
Ash.....	84	
Basswood.....	420,990	1.4
<b>TOTAL HARDWOODS.....</b>	<b>4,119,919</b>	<b>13.6</b>
<b>TOTAL.....</b>	<b>30,242,642</b>	

TABLE 15. — *Comparison of allowable cut with actual utilization by species.*

Species	Allowable cut	Actual cut
	Thousand cu. ft.	Thousand cu. ft.
Pine, white and red.....	11,623	23,058
Jack pine.....	6,414	825
Spruce.....	7,626	1,497
Balsam fir.....	2,738	1
Hemlock.....	726	722
Cedar.....	1,762	20
Other conifers.....	28	
<b>TOTAL CONIFERS.....</b>	<b>30,917</b>	<b>26,123</b>
Hard maple.....	1,891	836
Birch.....	21,610	1,839
Poplar.....	22,721	1,024
Basswood.....	97	421
Others.....	1,192	
<b>TOTAL HARDWOOD.....</b>	<b>47,511</b>	<b>4,120</b>
<b>TOTAL.....</b>	<b>78,428</b>	<b>30,243</b>



*By carefully scaling timber cut from Ontario's forests, the Department of Lands and Forests is able to keep a close check on timber production.*

# APPENDIX

## *Survey Methods*

● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six inch focal length camera to produce photographs on a scale of four inches to the mile (1/15840). Following the photography planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Systematic sampling was carried out by field crews who collected all the data necessary for the making of the volume estimates. On the completion of the field work finished forest type maps were prepared and areas determined by the usual methods<sup>1</sup>.

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for the three regions or ecological sections in the North Bay district. The per acre volumes in cubic feet, made up in this manner are shown in tables 18, 19, 20.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the North Bay district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the North Bay district are shown in figure 20.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the

species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 24.81 cubic feet per acre per annum, and for patented land 32.62 cubic feet per acre per annum. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

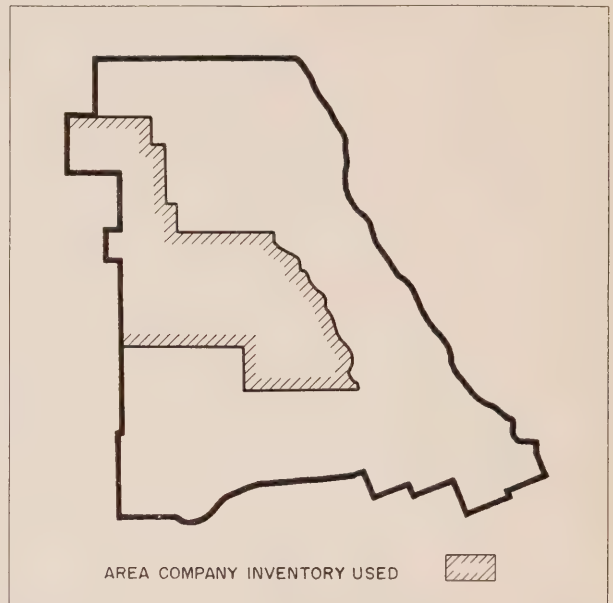


FIGURE 20

## *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range from 10 to 150 years, the mature age class from 30 to 300 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

## *Rotation*

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class Ib<sup>2</sup> were used as rotation ages for all species encountered. In addition to these, the rotation of one hundred years for white and black ash, ironwood and "other tolerants" has been adopted arbitrarily (table 16).

In calculations of allowable cut, a higher rotation for Crown land was used than that for patented land. The adoption of the lower rotation in the case of

<sup>1</sup> A complete outline of methods are to be found in: Manual of Timber Management, Part II and Part III, which may be obtained from Department of Lands Forests, Ontario, and Parliament Buildings, Toronto.

<sup>2</sup> Manual of Timber Management, Department of Lands and Forests, Ontario — Part II, page 50.



patented land is apparent from the reasons given in this report.

TABLE 16. — *Rotation ages by species.*

	Crown land	Patented land
	years	years
White pine.....	120	90
Red pine.....	100	60
Jack pine.....	60	40
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
Hemlock.....	300	150
White cedar.....	200	100
Larch.....	100	75
Hard maple.....	200	100
Yellow birch.....	150	120
White elm.....	150	100
Ironwood.....	100	100
Red oak.....	200	100
White birch.....	80	60
Poplar (all).....	50	30
Red maple.....	70	40
White and black ash.....	100	100
Basswood.....	90	60
Other tolerants.....	100	

#### *Allowable Cut*

##### (a) METHOD

The following two bases were available for calculation of allowable cut: (1) the volumes of the mature and immature age classes for each species, and (2) the adopted rotation ages.

The compilation was carried out in such a way that the volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory, for the following reasons:

(1) The ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 required by the French Method.

(2) In compilation, three age classes were used, the same number which the proposed French Method requires, although the division into thirds is not exactly the same.

(3) The French Method is recognized as sound enough, though not entirely free from those disadvantages normally connected with the volumetric

methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

##### (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

V.1. — denotes volume of mature timber (Age Class I)

V.2. — denotes volume of immature timber (Age Class II)

n — denotes rotation

P — denotes annual allowable cut

With the aid of the formula, allowable cut has been calculated for each species, separately, with full consideration of the actual growing stock of each species and the proper rotation. Thus all uncertain assumptions, such as on average rotation for all species, or on species content of the allowable cut calculated in one figure only for the whole district, have been eliminated.

The results of individual calculations for each species have been totalled and shown as allowable cut for Crown and patented land, respectively.

#### *Cull Factor*

The cull factors (table 17) used in this report, where it was found necessary either to calculate net merchantable volumes or calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, were taken from the figures for defect made available from operations being carried out in the district.

TABLE 17. — *Cull factors by species, North Bay district.*

Species	Cull
	per cent
White pine.....	30
Red pine.....	25
Jack pine.....	35
Spruce.....	20
Balsam fir.....	40 65
Hemlock.....	50
White cedar.....	35 65
Hard maple.....	35
Yellow birch.....	10
White birch.....	10 35
Poplar.....	20-30
Ash.....	30
Others.....	50 80

<sup>1</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.

TABLE 18. — *Volume of the primary growing stock in cubic feet per acre*

Algonquin Section 1947-48

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	23.1 307.0	22.6 300.8	19.8 262.7	..... 267.8	224.0 242.6	211.1 228.7	163.9 177.5	..... .....
Red pine.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	139.0 104.8	131.0 98.9	101.7 76.7	..... .....
Jack pine.....	4"-9" 10" up	..... .....	..... .....	..... .....	141.9 19.3	109.8 15.0	103.5 14.1	80.3 11.0	70.1 46.8
White spruce.....	4"-9" 10" up	19.1 93.4	18.7 91.5	16.4 79.9	..... .....	94.0 42.3	88.7 39.8	68.9 30.9	55.3 .....
Black spruce.....	4"-9" 10" up	117.5 17.6	115.1 17.2	100.6 15.0	42.1 103.0	143.6 19.6	135.3 18.5	105.1 14.3	254.1 .....
Balsam fir.....	4"-9" 10" up	76.1 11.4	74.6 11.1	65.2 9.7	59.5 .....	82.1 6.2	77.5 5.8	60.1 4.5	24.5 .....
Hemlock.....	4"-9" 10" up	181.1 771.8	177.3 756.1	154.9 660.5	..... .....	142.6 116.6	134.4 110.0	104.3 85.4	..... .....
White cedar.....	4"-9" 10" up	74.1 316.1	72.6 309.6	63.4 270.4	266.2 98.4	104.8 69.9	98.8 65.9	76.7 51.2	136.5 .....
TOTAL CONIFERS.....	4"-9" 10" up	491.0 1517.3	480.9 1486.3	420.3 1298.2	509.7 488.5	1039.9 617.0	980.3 581.7	761.0 451.5	540.5 46.8
Hard maple.....	4"-9" 10" up	2.8 12.2	2.8 11.9	2.4 10.4	..... .....	..... .....	..... .....	..... .....	34.3 .....
Yellow birch.....	4"-9" 10" up	18.2 209.4	17.8 205.2	15.6 179.1	8.7 .....	6.5 31.9	6.2 30.0	4.8 23.3	..... .....
White birch.....	4"-9" 10" up	38.7 176.4	37.9 172.8	33.1 150.9	51.3 181.8	61.3 50.1	57.8 47.2	44.8 36.7	37.8 .....
Poplar (all).....	4"-9" 10" up	5.4 12.1	5.3 11.9	4.6 10.4	..... .....	55.0 46.8	51.8 44.1	40.2 34.3	40.6 .....
Red maple.....	4"-9" 10" up	12.4 5.1	12.2 5.0	10.6 4.4	..... .....	10.9 0.6	10.4 0.5	8.0 0.4	..... .....
TOTAL HARDWOODS.....	4"-9" 10" up	77.5 415.2	76.0 406.8	66.3 355.2	60.0 181.8	133.7 129.4	126.2 121.8	97.8 94.7	112.7 .....
GRAND TOTAL.....	4"-9" 10" up	568.5 1932.5	556.9 1893.1	486.6 1653.4	569.7 670.3	1173.6 746.4	1106.5 703.5	858.8 546.2	653.2 46.8
TOTAL 4" UP.....		2501.0	2450.0	2140.0	1240.0	1920.0	1810.0	1405.0	700.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	7.4 18.1	6.9 16.8	5.2 12.8	..... .....
White spruce.....	4"-9" 10" up	3.1 13.9	2.7 12.4	2.1 9.8	..... .....	10.0 10.4	9.3 9.7	7.1 7.3	..... .....
Balsam fir.....	4"-9" 10" up	17.7 2.7	15.7 2.4	12.4 1.9	7.8 11.8	23.2 2.3	21.6 2.1	16.4 1.6	3.4 5.2
Hemlock.....	4"-9" 10" up	23.7 74.9	21.0 66.4	16.6 52.4	..... .....	7.3 13.1	6.8 12.2	5.2 9.2	..... .....
White cedar.....	4"-9" 10" up	12.4 11.4	11.0 10.1	8.7 8.0	1.2 58.6	7.0 10.0	6.5 9.3	4.9 7.1	0.5 25.3
TOTAL CONIFERS.....	4"-9" 10" up	56.9 102.9	50.4 91.3	39.8 72.1	9.0 70.4	54.9 53.9	51.1 50.1	38.8 38.0	3.9 31.0
Hard maple.....	4"-9" 10" up	269.3 1413.7	238.8 1253.6	188.5 989.5	225.3 49.5	107.9 126.7	100.5 118.0	76.2 89.4	99.0 21.7
Yellow birch.....	4"-9" 10" up	64.0 850.6	56.8 754.2	44.8 595.4	68.4 68.4	33.3 85.7	31.0 79.8	23.5 60.5	30.0 30.1
Beech.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	8.7 6.6	8.1 6.1	6.2 4.6	..... .....
White elm.....	4"-9" 10" up	8.3 83.5	7.3 74.1	5.8 58.5	..... .....	..... .....	..... .....	..... .....	..... .....
Ironwood.....	4"-9" 10" up	22.6 4.6	20.0 4.1	15.8 3.2	..... .....	17.8 0.9	16.5 0.9	12.5 0.7	..... .....

TABLE 18 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Red oak.....	4''-9''	2.2	2.0	1.6	.....	24.9	23.2	17.6	.....
	10'' up	18.2	16.1	12.7	.....	7.4	6.9	5.2	.....
White birch.....	4''-9''	49.0	43.4	34.3	138.0	352.1	327.8	248.5	60.6
	10'' up	104.0	92.3	72.8	.....	18.5	17.3	13.1	.....
Poplar (all).....	4''-9''	68.2	60.5	47.7	377.7	546.6	509.1	385.8	165.8
	10'' up	132.4	117.4	92.7	46.7	145.3	135.3	102.6	20.5
Red maple.....	4''-9''	10.7	9.5	7.5	32.5	35.8	33.4	25.3	14.3
	10'' up	6.3	5.6	4.4	35.3	8.4	7.8	5.9	15.5
Black ash.....	4''-9''	28.5	25.2	19.9	28.8	30.3	28.2	21.4	12.6
	10'' up	63.3	56.2	44.4	.....	25.8	24.0	18.2	.....
Basswood.....	4''-9''	7.8	6.9	5.4	.....	3.3	3.1	2.3	.....
	10'' up	33.0	29.3	23.2	.....	5.2	4.8	3.7	.....
TOTAL HARDWOODS.....	4''-9''	530.6	470.4	371.3	870.7	1160.7	1080.9	819.3	382.3
	10'' up	2709.6	2402.9	1896.8	199.9	430.5	400.9	303.9	87.8
GRAND TOTAL.....	4''-9''	587.5	520.8	411.1	879.7	1215.6	1132.0	858.1	386.2
	10'' up	2812.5	2494.2	1968.9	270.3	484.4	451.0	341.9	118.8
TOTAL 4'' UP.....		3400.0	3015.0	2380.0	1150.0	1700.0	1583.0	1200.0	505.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	7.4	7.0	5.8	.....	149.8	141.3	116.8	97.1
	10'' up	74.6	71.0	59.1	.....	64.2	60.6	50.1	158.4
Red pine.....	4''-9''	1.8	1.7	1.4	.....	35.5	33.5	27.7	.....
	10'' up	7.7	7.3	6.1	.....	14.5	13.7	11.3	.....
White spruce.....	4''-9''	29.2	27.8	23.1	.....	91.1	86.0	71.1	30.1
	10'' up	87.5	83.2	69.2	.....	44.9	42.3	35.0	35.3
Black spruce.....	4''-9''	0.9	0.8	0.7	.....	24.6	23.2	19.2	.....
	10'' up	2.3	2.2	1.8	.....	5.4	5.1	4.2	.....
Balsam fir.....	4''-9''	67.3	64.0	53.2	107.4	119.0	112.3	92.8	103.7
	10'' up	17.9	17.0	14.2	84.3	5.0	4.7	3.9	.....
Hemlock.....	4''-9''	126.0	119.9	99.7	.....	79.0	74.5	61.6	64.6
	10'' up	615.4	585.3	486.6	.....	89.0	84.0	69.4	.....
White cedar.....	4''-9''	59.2	56.3	46.8	24.2	57.3	54.1	44.7	41.6
	10'' up	152.2	144.8	120.4	148.6	64.7	61.0	50.5	21.4
TOTAL CONIFERS.....	4''-9''	291.8	277.5	230.7	131.6	556.3	524.9	433.9	337.1
	10'' up	957.6	910.8	757.4	232.9	287.7	271.4	224.4	215.1
Hard maple.....	4''-9''	82.5	78.5	65.3	.....	26.3	24.8	20.5	.....
	10'' up	261.4	248.6	206.7	.....	29.7	28.0	23.2	.....
Yellow birch.....	4''-9''	68.9	65.5	54.5	.....	27.7	26.2	21.6	.....
	10'' up	915.5	870.9	723.8	985.5	126.3	119.1	98.5	.....
Ironwood.....	4''-9''	5.9	5.6	4.7	.....	3.5	3.3	2.7	.....
	10'' up	0.4	0.4	0.3	.....	0.5	0.5	0.4	.....
Red oak.....	4''-9''	.....	.....	.....	.....	17.6	16.6	13.8	.....
	10'' up	.....	.....	.....	.....	4.4	4.2	3.4	.....
White birch.....	4''-9''	43.5	41.3	34.4	.....	234.7	221.5	183.1	149.2
	10'' up	212.1	201.8	167.7	.....	91.3	86.1	71.2	.....
Poplar (all).....	4''-9''	57.7	54.9	45.6	.....	369.4	348.5	288.1	52.7
	10'' up	128.4	122.2	101.6	.....	136.6	128.9	106.5	.....
Red maple.....	4''-9''	22.1	21.0	17.5	.....	34.0	32.1	26.6	43.9
	10'' up	22.1	21.0	17.4	.....	8.0	7.5	6.2	.....
Black ash.....	4''-9''	31.7	30.2	25.1	.....	26.2	24.7	20.5	.....
	10'' up	28.2	26.8	22.3	.....	19.8	18.7	15.4	.....
Basswood.....	4''-9''	2.8	2.6	2.2	.....	.....	.....	.....	.....
	10'' up	22.4	21.4	17.8	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4''-9''	315.1	299.6	249.3	.....	739.4	697.7	576.9	245.8
	10'' up	1590.5	1513.1	1257.6	985.5	416.6	393.0	324.8	.....
GRAND TOTAL.....	4''-9''	606.9	577.1	480.0	131.6	1295.7	1222.6	1010.8	582.9
	10'' up	2548.1	2423.9	2015.0	1218.4	704.3	664.4	549.2	215.1
TOTAL 4'' UP.....		3155.0	3001.0	2495.0	1350.0	2000.0	1887.0	1560.0	798.0



TABLE 19. — *Volume of the primary growing stock in cubic feet per acre**Timagami Section — 1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	28.9 905.3	27.2 878.0	24.6 796.5	9.6 472.3	48.4 82.3	45.2 76.9	36.4 61.9	.....
Red pine.....	4"-9" 10" up	29.4 706.3	28.5 685.0	25.9 621.3	.....	61.7 114.5	57.6 107.0	46.4 86.2	.....
Jack pine.....	4"-9" 10" up	390.9 260.6	379.1 252.8	343.9 229.2	66.7 171.4	590.2 51.3	551.5 48.0	444.2 38.6	228.8 25.4
White spruce.....	4"-9" 10" up	44.8 79.6	43.5 77.2	39.4 70.1	39.4 73.1	44.8 32.4	41.9 30.3	33.7 24.4	63.4 71.6
Black spruce.....	4"-9" 10" up	306.1 107.5	296.8 104.3	269.3 94.6	73.6 25.8	441.9 49.1	412.9 45.9	332.6 36.9	95.9 14.3
Balsam fir.....	4"-9" 10" up	81.7 6.1	79.2 6.0	71.9 5.4	56.2	76.0 3.2	71.0 3.0	57.2 2.4	126.8
White cedar.....	4"-9" 10" up	195.1 258.7	189.3 250.9	171.7 227.6	156.6 383.4	102.7 65.6	95.9 61.3	77.3 49.4	6.8 5.2
Larch.....	4"-9" 10" up	.....	.....	.....	.....	23.6 0.2	22.0 0.2	17.7 0.2	.....
TOTAL CONIFERS.....	4" 9" 10" up	1076.0 2324.1	1043.6 2254.2	946.7 2044.7	402.1 1126.0	1389.3 398.6	1298.0 372.6	1045.5 300.0	521.7 116.5
Hard maple.....	4" 9" 10" up	3.7	3.6	3.2	.....	.....	.....	.....	.....
Yellow birch.....	4" 9" 10" up	.....	.....	.....	.....	.....	.....	.....	.....
White birch.....	4"-9" 10" up	84.9 138.4	82.3 134.3	74.6 121.8	65.6 262.5	45.9 74.9	42.9 69.9	34.5 56.4	44.4 42.6
Poplar (all).....	4"-9" 10" up	17.1 15.8	16.6 15.4	15.1 13.9	10.9 7.9	47.8 23.5	44.6 22.0	35.9 17.7	24.8
Black ash.....	4" 9" 10" up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9" 10" up	105.7 154.2	102.5 149.7	92.9 135.7	76.5 270.4	93.7 98.4	87.5 91.9	70.4 74.1	69.2 42.6
GRAND TOTAL.....	4"-9" 10" up	1181.7 2478.3	1146.1 2403.9	1039.6 2180.4	478.6 1396.4	1483.0 497.0	1385.5 464.5	1115.9 374.1	590.9 159.1
TOTAL 4" UP.....		3660.0	3550.0	3220.0	1875.0	1980.0	1850.0	1490.0	750.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	5.4 128.5	5.2 125.1	4.7 113.9	19.0 81.0	7.0 51.3	6.5 47.7	5.2 38.3	.....
Red pine.....	4"-9" 10" up	.....	.....	.....	30.7 97.2	.....	.....	.....	.....
Jack pine.....	4"-9" 10" up	.....	.....	.....	.....	21.1 14.6	19.6 13.6	15.8 10.9	.....
White spruce.....	4"-9" 10" up	11.4 83.8	11.1 81.5	10.1 74.2	9.7 44.4	28.8 27.6	26.8 25.7	21.5 20.7	.....
Black spruce.....	4"-9" 10" up	5.2 0.7	5.1 0.7	4.7 0.6	.....	8.9 0.5	8.4 0.4	6.6 0.4	.....
Balsam fir.....	4"-9" 10" up	34.3 1.4	33.3 1.4	30.3 1.3	.....	19.5 1.2	18.0 1.2	14.6 0.9	.....
White cedar.....	4"-9" 10" up	5.1 9.8	4.9 9.6	4.5 8.7	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9" 10" up	61.4 224.2	59.6 218.3	54.3 198.7	59.4 222.6	85.3 95.2	79.3 88.6	63.7 71.2	.....
Hard maple.....	4"-9" 10" up	159.3 295.9	155.0 287.9	141.1 262.1	.....	31.5 19.3	29.3 18.0	23.5 14.4	.....
Yellow birch.....	4"-9" 10" up	51.1 517.1	49.8 503.1	45.3 458.0	.....	6.8 42.1	6.4 39.1	5.1 31.4	.....

TABLE 19 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
.....	4''-9'' 10'' up	3.0	2.9	2.6	.....	.....	.....	.....	.....
White birch.....	4''-9'' 10'' up	134.2 475.7	130.6 462.9	118.8 421.4	158.3 61.5	508.1 89.7	473.0 83.5	379.8 67.0	137.2 197.4
Poplar (all).....	4''-9'' 10'' up	185.3 844.0	180.3 821.4	164.1 747.6	865.0 273.2	791.6 210.4	736.9 195.9	591.6 157.3	380.4 .....
Red maple.....	4''-9'' 10'' up	13.1 10.7	12.8 10.4	11.6 9.4	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4''-9'' 10'' up	546.0 2143.4	531.4 2085.7	483.5 1898.5	1023.3 334.7	1338.0 361.5	1245.6 336.5	1000.0 270.1	517.6 197.4
GRAND TOTAL.....	4''-9'' 10'' up	607.4 2367.6	591.0 2304.0	537.8 2097.2	1082.7 557.3	1423.3 456.7	1324.9 425.1	1063.7 341.3	517.6 197.4
TOTAL 4'' UP.....		2975.0	2895.0	2635.0	1640.0	1880.0	1750.0	1405.0	715.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9'' 10'' up	18.7 354.9	18.3 347.1	16.5 314.3	23.8 452.2	94.1 174.7	90.7 168.5	76.6 142.3	5.7 185.1
Red pine.....	4''-9'' 10'' up	11.1 211.3	10.9 206.6	9.8 187.1	21.7 195.3	14.3 69.7	13.8 67.2	11.6 56.8	.....
Jack pine.....	4''-9'' 10'' up	44.8 121.2	43.8 118.6	39.7 107.3	.....	112.5 84.9	108.5 81.8	91.6 69.1	.....
White spruce.....	4''-9'' 10'' up	75.9 161.3	74.2 157.8	67.2 142.8	63.8 74.8	141.1 26.9	136.1 25.9	114.9 21.9	48.2 36.4
Black spruce.....	4''-9'' 10'' up	50.9 14.3	49.8 14.0	45.0 12.7	60.7 10.7	108.2 9.4	104.3 9.1	88.1 7.7	56.9 26.8
Balsam fir.....	4''-9'' 10'' up	105.2 10.4	102.9 10.2	93.2 9.2	32.2 .....	78.6 3.3	75.8 3.2	64.0 2.7	86.4 .....
White cedar.....	4''-9'' 10'' up	71.2 151.2	69.6 147.9	63.0 133.9	7.0 .....	25.9 20.3	24.9 19.6	21.1 16.5	6.9 14.7
TOTAL CONIFERS.....	4''-9'' 10'' up	377.8 1024.6	369.5 1002.2	334.4 907.3	209.2 733.0	574.7 389.2	554.1 375.3	467.9 317.0	204.1 263.0
Hard maple.....	4''-9'' 10'' up	28.0 37.2	27.4 36.4	24.8 32.9	.....	16.3 2.6	15.6 2.6	13.2 2.2	26.7 7.5
Yellow birch.....	4''-9'' 10'' up	23.7 272.8	23.2 266.8	21.0 241.5	.....	7.9 6.8	7.7 6.5	6.5 5.5	.....
White birch.....	4''-9'' 10'' up	241.1 562.5	235.8 550.1	213.4 498.0	167.8 131.8	398.4 170.7	384.2 164.6	324.4 139.0	112.9 184.1
Poplar (all).....	4''-9'' 10'' up	127.1 270.2	124.4 264.2	112.5 239.2	94.9 63.3	325.4 208.0	313.8 200.6	264.9 169.4	43.7 58.0
TOTAL HARDWOODS.....	4''-9'' 10'' up	419.9 1142.7	410.8 1117.5	371.7 1011.6	262.7 195.1	748.0 388.1	721.3 374.3	609.0 316.1	183.3 249.6
GRAND TOTAL.....	4''-9'' 10'' up	797.7 2167.3	780.3 2119.7	706.1 1918.9	471.9 928.1	1322.7 777.3	1275.4 749.6	1076.9 633.1	387.4 512.6
TOTAL 4'' UP.....		2965.0	2900.0	2625.0	1400.0	2100.0	2025.0	1710.0	900.0



TABLE 20. — Volume of the primary growing stock in cubic feet per acre

Central Transition Section — 1948

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	3.3	3.2	3.1	4.5	.....	.....	.....	.....
	10'' up	160.6	159.0	149.7	220.4	.....	.....	.....	.....
Red pine.....	4''-9''	5.3	5.3	5.0	.....	.....	.....	.....	.....
	10'' up	61.2	60.5	57.0	.....	.....	.....	.....	.....
Jack pine.....	4''-9''	372.9	369.0	347.7	108.3	618.6	609.2	564.2	199.5
	10'' up	372.9	368.9	347.8	342.9	61.2	60.3	55.8	24.7
White spruce.....	4''-9''	53.8	53.3	50.2	72.0	45.1	44.5	41.2	44.9
	10'' up	74.4	73.6	69.4	72.1	14.3	14.0	13.0	21.1
Black spruce.....	4''-9''	654.5	647.6	610.4	226.5	601.9	592.8	549.0	255.7
	10'' up	134.0	132.6	125.0	88.1	31.7	31.2	28.9	41.6
Balsam fir.....	4''-9''	75.6	74.8	70.5	51.1	60.1	59.2	54.8	46.1
	10'' up	7.5	7.4	7.0	3.3	5.9	5.8	5.4	.....
White cedar.....	4''-9''	89.3	88.4	83.3	52.4	23.0	22.6	20.9	104.7
	10'' up	145.8	144.2	136.0	75.5	16.6	16.4	15.2	18.5
Larch.....	4''-9''	.....	.....	.....	.....	28.2	27.8	25.7	.....
	10'' up	.....	.....	.....	.....	1.5	1.5	1.4	.....
TOTAL CONIFERS.....	4''-9''	1254.7	1241.6	1170.2	514.8	1376.9	1356.1	1255.8	650.9
	10'' up	956.4	946.2	891.9	802.3	131.2	129.2	119.7	105.9
White birch.....	4''-9''	56.7	56.1	52.8	49.5	62.1	61.1	56.7	17.6
	10'' up	50.2	49.7	46.9	84.3	25.4	25.0	23.1	20.6
Poplar (all).....	4''-9''	20.5	20.3	19.2	8.0	34.3	33.8	31.3	.....
	10'' up	36.5	36.1	34.0	11.1	20.1	19.8	18.4	.....
TOTAL HARDWOODS.....	4''-9''	77.2	76.4	72.0	57.5	96.4	94.9	88.0	17.6
	10'' up	86.7	85.8	80.9	95.4	45.5	44.8	41.5	20.6
GRAND TOTAL.....	4''-9''	1331.9	1318.0	1242.2	572.3	1473.3	1451.0	1343.8	668.5
	10'' up	1043.1	1032.0	972.8	897.7	176.7	174.0	161.2	126.5
TOTAL 4'' UP.....		2375.0	2350.0	2215.0	1470.0	1650.0	1625.0	1505.0	795.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	23.8	22.6	19.4	.....	48.8	44.1	33.9	.....
	10'' up	53.1	50.3	43.2	.....	76.2	68.9	53.1	.....
White spruce.....	4''-9''	53.3	50.6	43.4	.....	21.0	19.0	14.6	.....
	10'' up	60.2	57.0	49.0	.....	14.0	12.6	9.8	.....
Black spruce.....	4''-9''	27.4	26.0	22.4	.....	23.7	21.4	16.4	20.7
	10'' up	9.2	8.7	7.4	.....	3.8	3.5	2.7	.....
Balsam fir.....	4''-9''	27.1	25.7	22.1	24.5	27.9	25.2	19.4	.....
	10'' up	9.5	9.0	7.7	.....	2.1	1.9	1.5	.....
TOTAL CONIFERS.....	4''-9''	131.6	124.9	107.3	24.5	121.4	109.7	84.3	20.7
	10'' up	132.0	125.0	107.3	.....	96.1	86.9	67.1	.....
White birch.....	4''-9''	553.1	524.4	450.4	325.7	483.8	437.4	336.7	185.8
	10'' up	285.0	270.2	232.0	554.6	106.2	96.0	73.9	14.0
Poplar (all).....	4''-9''	639.6	606.4	520.8	240.9	1337.1	1208.7	930.6	543.6
	10'' up	1918.7	1819.1	1562.2	536.1	355.4	321.3	247.4	135.9
Red maple.....	4''-9''	.....	.....	.....	68.2	.....	.....	.....	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4''-9''	1192.7	1130.8	971.2	634.8	1820.9	1646.1	1267.3	729.4
	10'' up	2203.7	2089.3	1794.2	1090.7	461.6	417.3	321.3	149.9
GRAND TOTAL.....	4''-9''	1324.3	1255.7	1078.5	659.3	1942.3	1755.8	1351.6	750.1
	10'' up	2335.7	2214.3	1901.5	1090.7	557.7	504.2	388.4	149.9
TOTAL 4'' UP.....		3660.0	3470.0	2980.0	1750.0	2500.0	2260.0	1740.0	900.0



TABLE 20 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	5.9	5.6	5.2	.....	1.5	1.4	1.1	.....
	10'' up	189.2	182.2	168.5	433.2	12.0	11.1	8.9	.....
Red pine.....	4''-9''	0.4	0.4	0.3	.....	.....	.....	.....	.....
	10'' up	36.2	34.8	32.3	.....	.....	.....	.....	.....
Jack pine.....	4''-9''	167.5	161.2	149.1	.....	279.3	259.4	206.9	72.6
	10'' up	311.0	299.4	277.0	.....	164.0	152.3	121.5	42.6
White spruce.....	4''-9''	95.5	91.9	85.0	44.8	103.9	96.5	77.0	51.5
	10'' up	169.7	163.4	151.1	234.9	55.9	51.9	41.4	30.2
Black spruce.....	4''-9''	138.0	132.8	122.9	21.6	215.8	200.5	160.0	80.6
	10'' up	51.0	49.1	45.4	64.6	11.4	10.6	8.4	13.1
Balsam fir.....	4''-9''	103.8	99.8	92.4	130.2	94.1	87.5	69.8	40.4
	10'' up	21.2	20.5	18.9	21.2	7.1	6.6	5.2	3.5
White cedar.....	4''-9''	18.5	17.8	16.5	41.9	10.3	9.5	7.6	.....
	10'' up	39.4	37.9	35.1	132.6	7.7	7.2	5.7	.....
TOTAL CONIFERS.....	4''-9''	529.6	509.5	471.4	238.5	704.9	654.8	522.4	245.1
	10'' up	817.7	787.3	728.3	886.5	258.1	239.7	191.1	89.4
Yellow birch.....	4''-9''	6.9	6.6	6.1	.....	.....	.....	.....	.....
	10'' up	38.8	37.4	34.6	.....	.....	.....	.....	.....
White birch.....	4''-9''	452.5	435.6	402.9	254.1	480.1	446.0	355.7	197.6
	10'' up	254.6	245.1	226.7	381.1	91.4	84.9	67.7	88.8
Poplar (all).....	4''-9''	237.0	228.1	211.0	181.7	515.2	478.5	381.7	165.0
	10'' up	710.9	684.4	633.0	161.1	200.3	186.1	148.4	74.1
TOTAL HARDWOODS.....	4''-9''	696.4	670.3	620.0	435.8	995.3	924.5	737.4	362.6
	10'' up	1004.3	966.9	894.3	542.2	291.7	271.0	216.1	162.9
GRAND TOTAL.....	4''-9''	1226.0	1179.8	1091.4	674.3	1700.2	1579.3	1259.8	607.7
	10'' up	1822.0	1754.2	1622.6	1428.7	549.8	510.7	407.2	252.3
TOTAL 4'' UP.....		3048.0	2934.0	2714.0	2103.0	2250.0	2090.0	1667.0	860.0

Common and Botanical Names of Tree Species  
included in Timber Estimates.

CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill) BSP.
Balsam-fir.....	<i>Abies balsamea</i> (L.) Mill.
Hemlock.....	<i>Tsuga canadensis</i> (L.) Carr.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

HARDWOODS

Hard maple.....	<i>Acer saccharum</i> Marsh.
Yellow birch.....	<i>Betula lutea</i> Michx. f.
Beech.....	<i>Fagus grandifolia</i> Erhr.
White elm.....	<i>Ulmus americana</i> L.
Ironwood.....	<i>Ostrya virginiana</i> (Mill.) K. Koch.
Red oak.....	<i>Quercus borealis</i> Michx. f.
Red maple.....	<i>Acer rubrum</i> L.
White ash.....	<i>Fraxinus americana</i> L.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
Basswood.....	<i>Tilia glabra</i> Vent.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.

## *Notes*

---

## *Notes*

---



## *Notes*

---





**Hon. Welland S. Gemmell**  
*Minister*

**F. A. MacDougall**  
*Deputy Minister*



Report No. 3 of the  
**COCHRANE DISTRICT**

CAZON  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management  
Ontario Department of Lands and Forests



# *Forest Resources Inventory*

— 1953 —

Report No. 3 of the  
COCHRANE DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests



# PREFACE

● One of the important undertakings of the Ontario Department of Lands and Forests in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to the Province of Ontario one-half of the expenditures incurred in forest resources inventory under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

The past half century—little more than one-half a rotation period in forest growth—has witnessed the origin and rise of the pulp and paper industry to the position of “Canada’s Leading Industry.” Advances in research and development in processes of manufacture are going forward at an accelerated rate. The possibility of manufacturing, economically, the present wood waste, unused species, and qualities into marketable products offers a challenge to research—their quantities give it direction. Modern forest inventory has therefore shifted from its former position of concentration on giving presently utilizable volumes, to one of presenting the forest resource picture as a whole. The volume of the primary growing stock in cubic feet gives the total wood resources. From these figures, not only can the volume of utilizable wood under present economic and industrial conditions be calculated, but these estimates may be adjusted also, to the progressive change in utilization standards in a rapidly developing economy.

For purposes of administration of the renewable natural resources of the Province, the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete, and parts of two, of these forest administrative districts, totalling 172,000 square miles, and comprising the accessible forest area of Ontario. This report deals with the results of the inventory in the Cochrane district.

Aerial photographs of the district were taken during the summer of 1947. This report was compiled from data collected in the field by the Forest Resources Inventory Section of the Division of Timber Management, together with data supplied by timber licensees in the district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the province as a whole. This objective may be attained most effectively through the use of the comprehensive forest resources data in the preparation of long term timber management plans.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	SAWLOGS VS. PULPWOOD.....	15
FOREST INVENTORY.....	9	ALLOWABLE CUT.....	19
AREAS.....	9	UTILIZATION VS. ALLOWABLE CUT.....	22
FOREST LAND OWNERSHIP.....	9	APPENDIX.....	24
AGE CLASSES.....	10	SURVEY METHODS.....	24
REGIONAL FOREST TYPES.....	11	MEAN ANNUAL INCREMENT.....	24
COVER TYPES.....	12	AGE CLASSES.....	24
VOLUME.....	13	ROTATION.....	24
CONIFERS VS. HARDWOODS.....	14	ALLOWABLE CUT.....	25
		CULL FACTOR.....	25

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES IN THE COCHRANE DISTRICT.....	9	FIG. 12 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASS.....	16
FIG. 2 — COCHRANE DISTRICT, 1951.....	10	FIG. 13 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL HARDWOOD SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES — COCHRANE DISTRICT.....	16
FIG. 3 — LAND OWNERSHIP WITHIN THE COCHRANE DISTRICT.....	10	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE COCHRANE DISTRICT.....	20
FIG. 4 — ECOLOGICAL DIVISIONS.....	11	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND	21
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES IN THE COCHRANE DISTRICT.....	12	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LAND.	21
FIG. 6 — VOLUME OF PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNER- SHIP.....	13	FIG. 17 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LAND. ....	22
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK OF PRINCIPAL SPECIES ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	14	FIG. 18 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS BY SPECIES ON CROWN LAND.....	22
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	15	FIG. 19 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF HARDWOODS BY SPECIES ON CROWN LAND.....	23
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	15	FIG. 20 — AREA COMPANY INVENTORY USED.....	24
FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LAND BY SIZE CLASSES.....	15		
FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	16		





# SURVEY HIGHLIGHTS

1. The total area of the Cochrane district is 7,355,150 acres. Classified into broad land classes, 75 per cent is productive forest land, 17 per cent non-productive lands, one per cent is non-forested land and 7 per cent is water.

2. Ninety per cent of the total area is owned by the Crown and 10 per cent is patented land. There are a total of 60,652 acres of developed agricultural land. Only about 7 per cent of the patented land area is in farm crops.

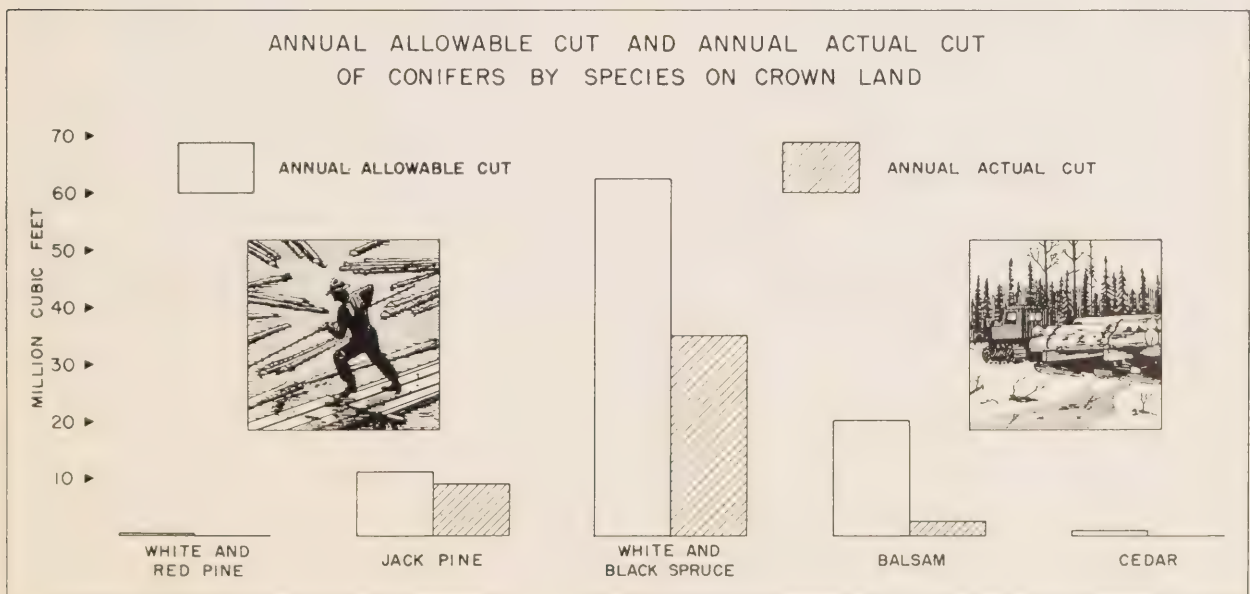
3. The volume of wood in the Cochrane district including all species is 8.25 billion cubic feet. Four-fifths of the total volume is in mature stands which average 2,176 cubic feet per acre.

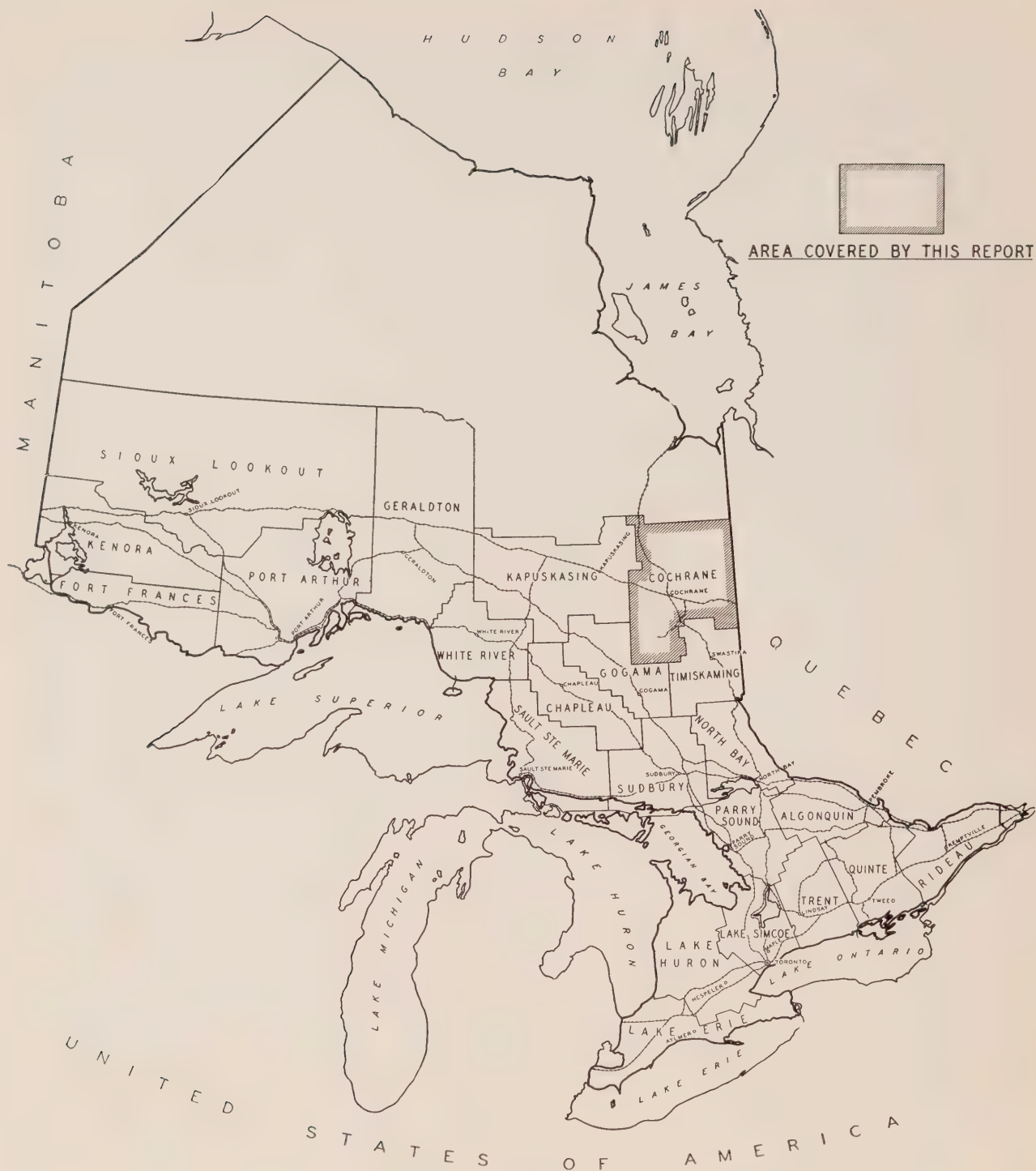
4. The most important species is black spruce which makes up 45 per cent of the total volume. Among the conifers or softwood species, balsam fir with 13 per cent of the total volume comes second, followed by white spruce with 7 per cent and jack pine with 6 per cent of the total volume. Two hardwood or broadleaved species have important volumes, poplar making up 20 per cent and white birch 7 per cent of the total cubic volume.

5. In the mature age class on Crown lands only 26 per cent of the volume of conifers is in the sawlog size class, 10 inches and over in diameter. White spruce and jack pine furnish most of the sawlog size material; only 14 per cent of the volume of black spruce is 10 inches d.b.h. and over. Of the total volume of hardwoods in the mature forest on Crown lands, 73 per cent is in the 10 inch d.b.h. and over size class.

6. The annual allowable cut for conifers on Crown lands is 96 million cubic feet gross total volume, made up of 65 per cent black and white spruce, 21 per cent balsam fir, 12 per cent jack pine and 2 per cent other conifers. No species is at the present time being cut at a rate over the allowable cut. The utilization of coniferous or softwood species is currently 49 per cent of the allowable cut. Only about 2 per cent of the allowable cut of hardwoods is being utilized at the present time.

7. The allowable cut of all species on patented lands is 26 million cubic feet, which is equally distributed between softwood and hardwood species.





MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50 60 70 80 90 100

MARCH, 1933.



*Forest resources inventory photograph of Town of Cochrane taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area shown in this report does not represent the entire Cochrane district. A comparatively small area above 50°00' N latitude was not photographed and so has been omitted from this inventory. With this exception, the total area of the Cochrane district excluding Indian Reserve land is 7,355,150 acres (table 1), 11,492 square miles, made up of 199 townships and a large portion of land in the north-east so far unsurveyed. Water covers an area of 503,428 acres, 7 per cent of the total area, leaving a net land area of 6,851,722 acres. Non-productive forest land, which appears to be permanently unfit for commercial timber production due to very low productivity, occupies 1,251,142 acres or 17 per cent of the total area. Non-forested lands, including lands permanently withdrawn from timber production, comprise 110,268 acres or slightly over one per cent

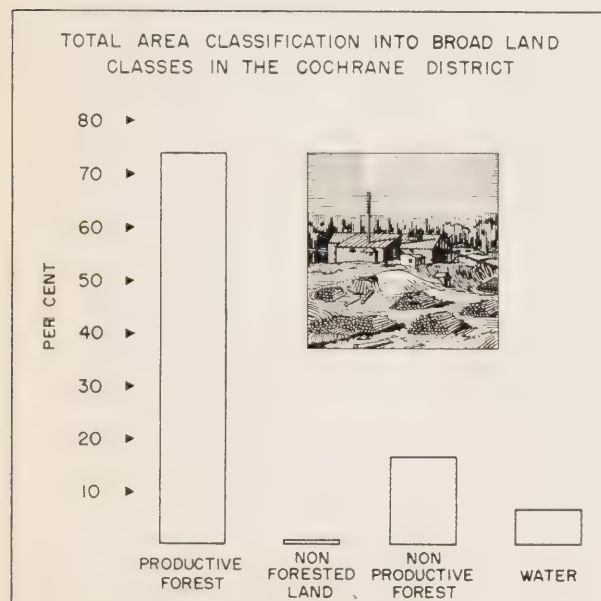


FIGURE 1

of the total area (fig. 1). In this classification are the developed agricultural lands of 60,652 acres, pasture lands totalling 11,830 acres and lands occupied by cities, towns, villages, roads and railroads or otherwise withdrawn from forest production covering 37,786 acres.

The Cochrane district is essentially a timber producing area with 5,490,312 acres or 75 per cent

of the total area classified as productive forest land (fig. 1). Due to the short growing season, it appears unlikely that agricultural development will expand greatly despite the good land available in certain sections. The district is covered by a Boreal forest with spruce, poplar and balsam fir comprising 85 per cent of the volume. Jack pine, red pine, and white pine are all found within the district in smaller quantities.

TABLE 1.—Total area classification into broad land and ownership groupings.

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	4,943,563	546,749	5,490,312
Non-forested land <sup>2</sup>			
Developed agricultural land.....	13,087	47,565	60,652
Grass and meadow land.....	4,983	6,847	11,830
Non-reproducing burn.....	4,892	1,360	6,252
Unclassified land <sup>3</sup> .....	17,929	13,605	31,534
TOTAL.....	40,891	69,377	110,268
Non-productive forest <sup>4</sup>			
Open muskeg.....	579,642	8,509	588,151
Treed muskeg (scrub).....	383,903	49,529	433,432
Brush, alder, and flooded land....	178,609	43,366	221,975
Rock outcrop.....	6,369	1,122	7,491
Barrens.....	55	38	93
TOTAL.....	1,148,578	102,564	1,251,142
Water.....	503,428		503,428
TOTAL AREA.....	6,636,460	718,690	7,355,150

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be out of commercial timber producing class owing to very low productivity.

## Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted or sold under the various land settlement regulations

which have been in force from time to time. Lands are also patented for mining purposes, summer resort, and other uses. All of these various types of ownership are grouped under "patented lands", which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at the time the patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands is therefore an intricate mosaic. In the course of the inventory no attempt was made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

Of the total area of the Cochrane district of 7,355,150 acres, 6,636,460 acres are owned by the Crown and 718,690 acres is patented (table 1). Ninety per cent of the total area is Crown land and 10 per cent patented land (fig. 3).

Developed agricultural lands occupy 47,565 acres or almost 7 per cent of the total patented land area. An additional area of 13,087 acres of developed agricultural land is in Crown ownership. This is, for the most part, located land for which patent has not been issued.

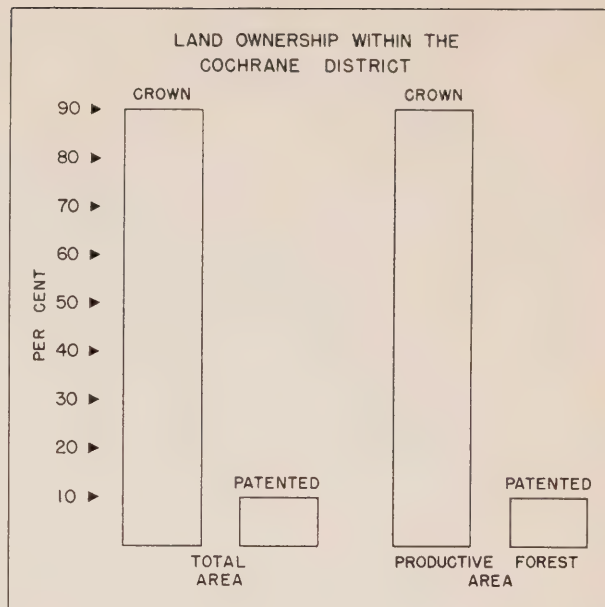


FIGURE 3

### Age Classes

For sustained yield operations, a forest should contain trees of all age classes and stages of development from seedlings to mature timber, in such proportions that when one group of trees is harvested, another is ready to take its place. This condition is not met by the present forests in the Cochrane district.

For the total productive forest, 3,150,129 acres or 57 per cent is mature, 1,006,110 acres or 18 per cent is immature, and 1,334,073 acres or 25 per cent consists of young growth and reproducing forest. This distribution shows a considerable surplus of mature timber, a great deficiency of immature and a slight deficiency in reproduction and young growth.

The age class distribution on the Crown lands is essentially the same as for the entire area. There is an increase of one per cent in the mature area and a corresponding decrease of one per cent in the reproduction and young growth. There is a slight improvement on patented lands where 50 per cent is mature, 24 per cent immature and 26 per cent young growth and reproduction.

There is, however, a considerable accumulation of mature and overmature timber on both Crown and patented land. This indicates the necessity of more intensive utilization in the near future, to regulate yield, and also to raise the production of raw material which remains at a low level due to the abundance of slow growing mature types.

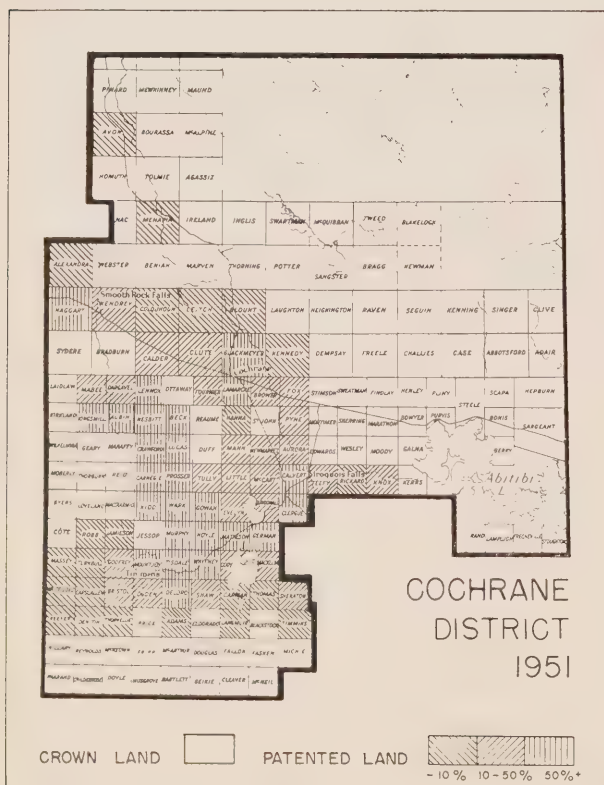


FIGURE 2



TABLE 2.—*Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	Productive forest
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	2,169,439	198,197	2,367,636	43
Hardwood.....	54,411	16,721	71,132	1
Mixedwoods.....	654,761	56,600	711,361	13
TOTAL.....	2,878,611	271,518	3,150,129	57
Immature forest:				
Coniferous.....	434,906	38,691	473,597	9
Hardwood.....	117,835	37,361	155,196	3
Mixedwoods.....	323,736	53,581	377,317	7
TOTAL.....	876,477	129,633	1,006,110	19
Young growth:				
Coniferous.....	391,282	12,619	403,901	7
Hardwood.....	76,029	14,534	90,563	2
Mixedwoods.....	213,188	51,097	264,285	5
TOTAL.....	680,499	78,250	758,749	14
Reproducing forest.....	507,976	67,348	575,324	10
TOTAL PRODUCTIVE FOREST.....	4,943,563	546,749	5,490,312	100

### Regional Forest Types

The regional distribution of forest types in Ontario is influenced by lowering in temperature from south to north and a reduction in rainfall and general atmospheric humidity from east to west. The regularity of the response of forest growth to these two variable factors is modified by proximity of large bodies of water, especially the "Great Lakes" system, topography, the distribution of broad soil types and other local conditions. These factors are expressed in the limits of distribution of certain commercial tree species, and in the volume and growth rate of the forest. Separate volume tables and yield tables are made for each ecological section (regional forest type) and they serve as units in the compilation of volume estimates. The Cochrane district is divided into three major sections (fig. 4) primarily upon the drainage qualities which deteriorate from south to north. The southern section is characterized by mixed stands, the central portion by black spruce, and the northern section by black spruce greatly reduced in growth by the high water table. The sections are as follows:

1. The Central Transition section comprising 9 per cent of the total area occupying the southern portion of the district.

2. The Clay Belt section covering the central portion of the district comprises 73 per cent of the total.

3. The Coastal Plain section in the north covers 18 per cent of the district.

The Central Transition section is basically a Boreal forest in which the mixed types of black spruce, balsam fir, and white birch with scattered white spruce and poplar are characteristic. A small amount of white and red pine appears on rocky shores and ridges. Jack pine occurs on dry ridges and sandy flats. Pure black spruce stands appear on the poorly drained sites. White birch and poplar are the only important hardwood species. This section has a rolling topography with many lakes, a thin glacial soil overlying a bed-rock of Pre-Cambrian granites and gneisses.

The Clay Belt section, which includes most of the district, has relatively poor drainage which favours the extensive coniferous associations found here. Black spruce is the dominant species, mixed with

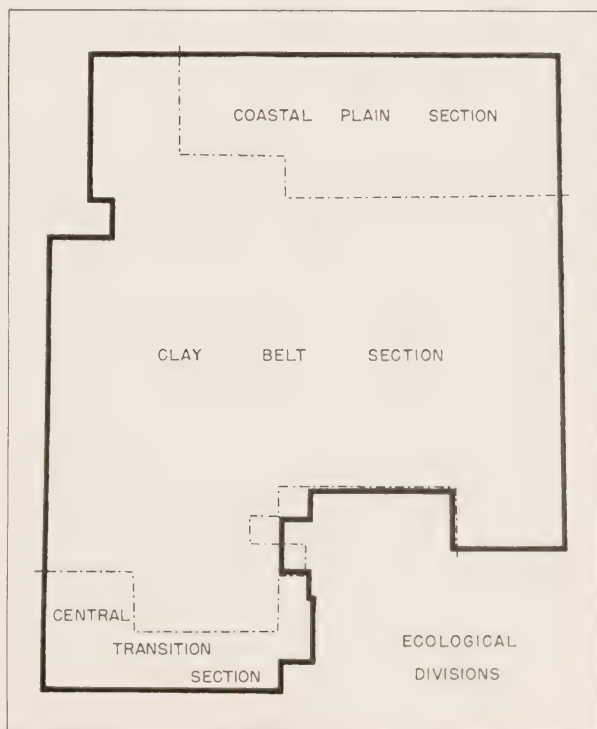


FIGURE 4

larch and white cedar. Improvement in drainage, due to slight elevations, results in mixed stands of white birch, poplar, balsam and white spruce. Characteristics of this section are extensive clay deposits, absence of surface rocks, poor drainage, few lakes, and a high water-table.

The Coastal Plain section in the north has a flat topography and poor drainage. Stands of black spruce reduced in growth by the high water-table are prevalent. Back from the rivers are large areas of muskeg and bog. Along the low alluvial banks of the rivers is a narrow strip of good tree growth. Here are found white spruce, balsam fir, white cedar, poplar, and white birch.

### Cover Types

The forests of the Cochrane district contain only ten commercial tree species. Six of these make up 98 per cent of the total wood volume. These are black spruce which makes up 45 per cent of the total volume, balsam fir 13 per cent, white spruce 7 per cent, jack pine 6 per cent; along with the intolerant

TABLE 3.—*Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type						
Mature.....	2,169,439	44	198,197	36	2,367,636	43
Immature.....	434,906	9	38,691	7	473,597	9
Young growth..	391,282	8	12,619	3	403,901	7
TOTAL.....	2,995,627	61	249,507	46	3,245,134	59
Hardwood type						
Mature.....	54,411	1	16,721	3	71,132	1
Immature.....	117,835	2	37,361	7	155,196	3
Young growth..	76,029	2	14,534	3	90,563	2
TOTAL.....	248,275	5	68,616	13	316,891	6
Mixedwoods type						
Mature.....	654,761	13	56,600	10	711,361	13
Immature.....	323,736	7	53,581	10	377,317	7
Young growth..	213,188	4	51,097	9	264,285	5
TOTAL.....	1,191,685	24	161,278	29	1,352,963	25
Reproducing forest.....	507,976	10	67,348	12	575,324	10
TOTAL PRODUCTIVE FOREST.....	4,943,563	100	546,749	100	5,490,312	100

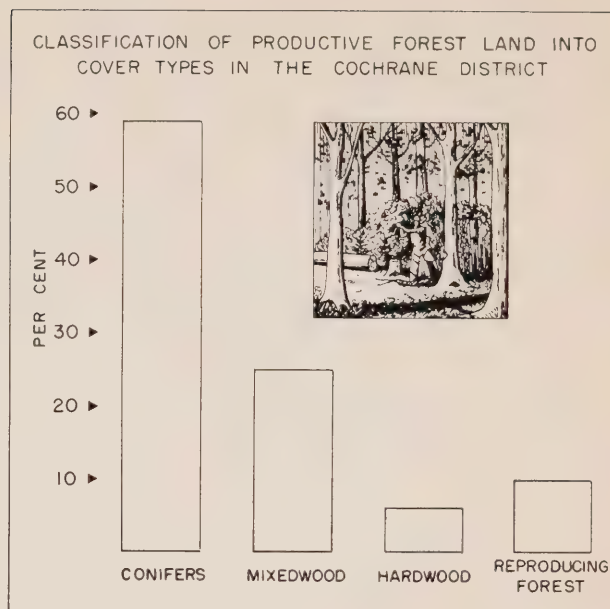


FIGURE 5

hardwoods, poplar makes up 20 per cent and white birch 7 per cent. White pine, red pine, white cedar, tamarack and some miscellaneous hardwood are represented in the forests of the district.

The forests of the district are described under three broad cover types: coniferous, hardwood and mixedwoods. The coniferous type is composed of 75 per cent or more conifers or softwood trees, the hardwood type contains 75 per cent hardwood or broad-leaved trees. All other combinations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts areas of reproducing forests, too recently established to have attained a sufficiently stable composition to be classified into types on the basis of composition. These areas are referred to as reproducing forest.

Over the district as a whole the coniferous type is predominant, covering 59 per cent of the productive forest area. The mixedwoods type occupies 25 per cent and the hardwood type 6 per cent leaving 10 per cent in the reproducing forest class (table 3, fig. 5).

The distribution of cover types on Crown lands is very similar to the productive area with: 61 per cent coniferous, 24 per cent mixedwoods, 5 per cent hardwood and 10 per cent reproducing forest. For patented lands the cover type distribution shows: 46 per cent coniferous, 29 per cent mixedwoods, 13 per cent hardwood and 12 per cent is reproducing forest.



## Volume

The volume of the primary growing stock includes all live trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district. It consists of the wood volume inside bark in cubic feet, including stump and top, and cull or defective portions of living trees, but excludes all limb wood.

For the Cochrane district, the volume of the primary growing stock on productive forest lands is approximately 8.25 billion cubic feet, which is an average of 1,502 cubic feet per acre (table 4). Of this

TABLE 4.—Volume per acre of the primary growing stock.

	Crown land			Patented land			Average total
	4"-9" d.b.h.	10"up d.b.h.	Average	4"-9" d.b.h.	10"up d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1336	810	2146	1579	912	2491	2176
Immature.....	1123	269	1392	1181	164	1345	1386
Productive forest.....	977	519	1496	1064	492	1556	1502

volume, about 6.9 billion cubic feet is mature and 1.4 billion cubic feet is immature (fig. 6). On a per acre basis, the mature volume is 2,176 cubic feet, the immature 1,386 cubic feet.

On Crown lands, the primary growing stock is 7.4 billion cubic feet (table 6). Spread over the entire productive forest area of Crown land this averages 1,496 cubic feet per acre. The mature volume is 6.2

billion cubic feet or 2,146 cubic feet per acre. The immature volume is 1.2 billion cubic feet or 1,392 cubic feet per acre.

Patented lands contain a volume of just under 851 million cubic feet (table 7) or 1,556 cubic feet per acre. The mature age class contains 676 million cubic feet, which is 2,491 cubic feet per acre. The immature age class, of 174 million cubic feet, contains 1,345 cubic feet per acre (fig. 6).

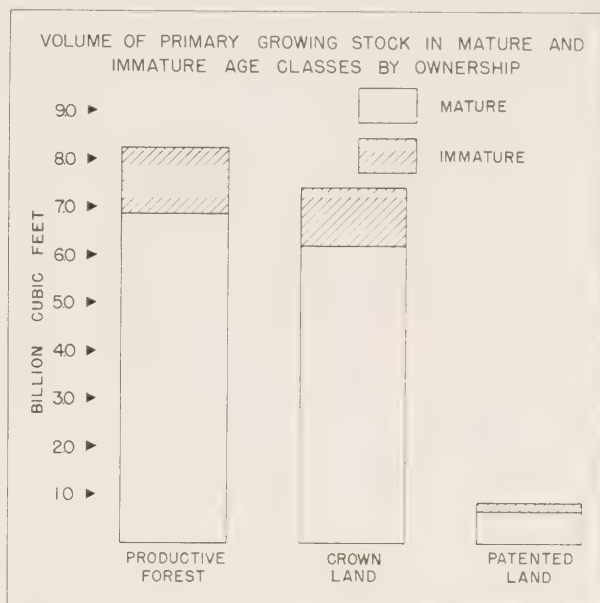


FIGURE 6



A stand of poplar timber.



Ground vegetation.



### Conifers vs. Hardwoods

The volume of the primary growing stock is mainly coniferous. This group contains almost 6 billion cubic feet which represents 73 per cent of the total volume. The hardwood species, representing 27 per cent of the volume, make up over 2 billion cubic feet. The mature age class contains 86 per cent of the total coniferous volume and 77 per cent of the total hardwood volume. The mature volume is composed of 5.1 billion cubic feet of conifers and 1.7 billion cubic feet of hardwoods. The immature age class is composed of 866 million cubic feet, or 62 per cent conifers, and 528 million cubic feet, or 38 per cent hardwoods.

The two groups shown in figure 7 are composed of eight conifers: white, red, and jack pine, white and black spruce, balsam fir, cedar, and larch; and four hardwoods: yellow and white birch, poplar and red maple. In the coniferous group 90 per cent of the volume is made up of the two spruces and balsam. One hardwood species, poplar, comprises 73 per cent of the entire hardwood volume. It is thus apparent that four species—the two spruces, balsam, and poplar—containing 85 per cent of the total volume, constitute the principal growing stock in the district.

A comparison of the mature and immature age classes suggests that some changes in species composition are taking place within this district. The small

volumes of red and white pine now present are disappearing entirely. The leading species, spruce, represents 56 per cent of the mature volume and only 34 per cent of the immature. Jack pine, which forms 4 per cent of the mature volume, increases to 15 per cent of the immature volume. Poplar and white birch show an increase of around 12 per cent in the immature volume. Of the present main species balsam fir remains constant in the immature stands, spruce declines and poplar increases. Two species, jack pine and white birch, which at present are of secondary importance, show a considerable increase in the immature stands.



*Unloading pulpwood from a truck.*

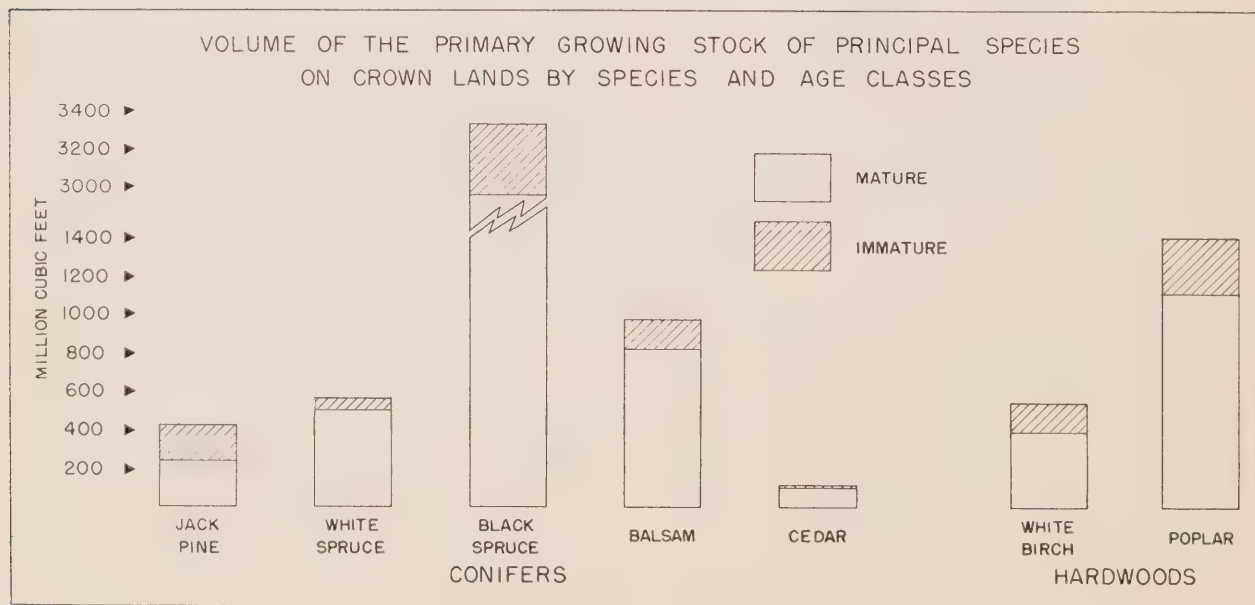


FIGURE 7

### Sawlogs vs. Pulpwood

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, 4-9 inches d.b.h. and 10 inches and over. Volumes in the smaller diameter group are considered as potential pulpwood and cordwood material. Some poles, posts, ties and other products may be obtained from this class. Volumes in the 10 inch and over group are considered primarily for sawlogs and other uses where larger timber is required. On the average, a tree 10 inches d.b.h. will give one sixteen foot log, 8 inches in diameter at the smaller end. The residual material at the smaller end may be diverted to any of the uses for which the 4-9 inch diameter group is suitable. The volume in these tops is relatively small

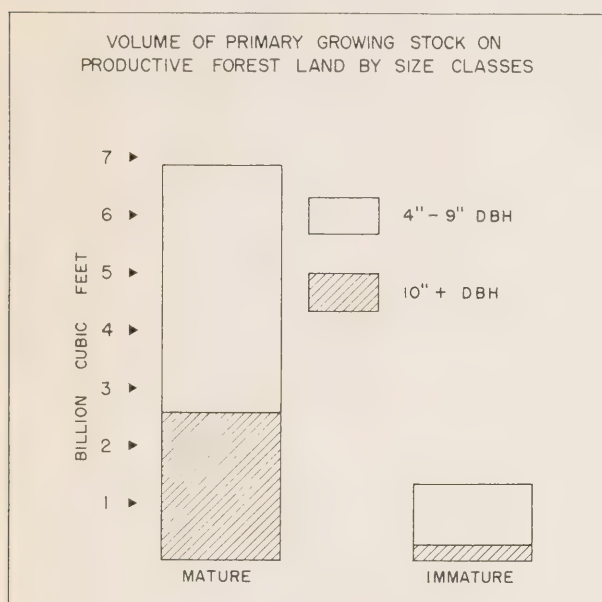


FIGURE 8

and is included in the 10 inches and over group in all inventory estimates.

Of the volume of primary growing stock on productive forest lands, 5.4 billion cubic feet are in the 4-9 inch d.b.h. group, and 2.8 billion cubic feet in the 10 inch d.b.h. group and over (table 8). For the coniferous species 4.6 billion cubic feet are in the smaller diameter group and 1.4 billion cubic feet in the larger. In hardwoods, 1.4 billion cubic feet are in 10 inches and over class, while only 852 million cubic feet are in the smaller diameter group.

The volume of the primary growing stock in the mature age class on productive forest lands shows 4.3 billion cubic feet in the 4-9 inch size class and 2.6

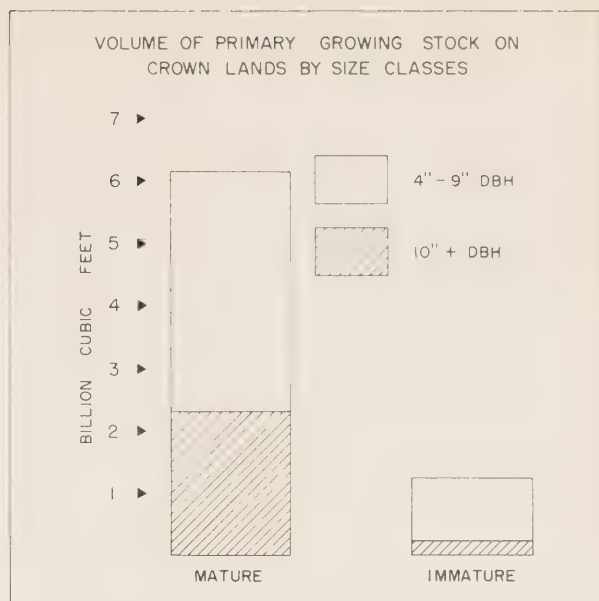


FIGURE 9

billion cubic feet in the 10 inch and over size class. Sixty-two per cent of the volume is 4-9 inches d.b.h. and 38 per cent 10 inches and over (table 8, fig. 8). When considering the immature age class, 82 per cent of the volume of the primary growing stock is 4-9 inches d.b.h. (fig. 8).

The volume of the primary growing stock separated into the two size classes for Crown lands (table 9, fig. 9) shows the same relationship as for the produc-

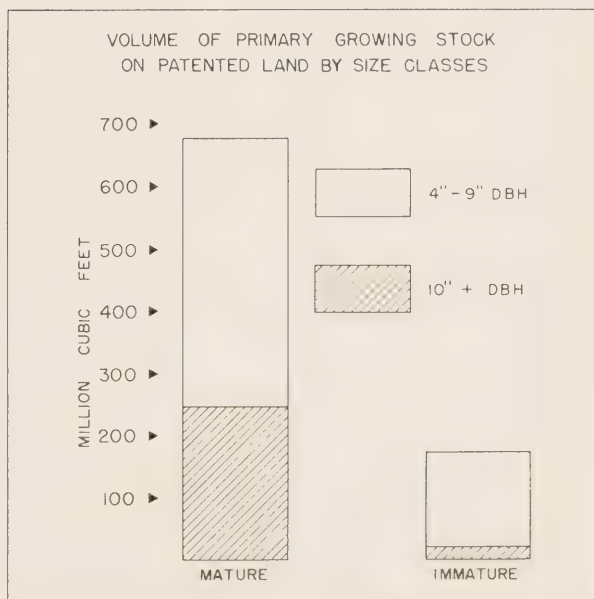


FIGURE 10



tive forest. Patented lands (table 10, fig. 10), although having a larger proportion of immature timber, show approximately the same volume relationship of the two size classes as found for the productive forest.

The size class relationships of coniferous species in the mature age class on Crown lands (fig. 11) show that jack pine and white spruce produce most of the sawlog size material. The proportion of sawlog

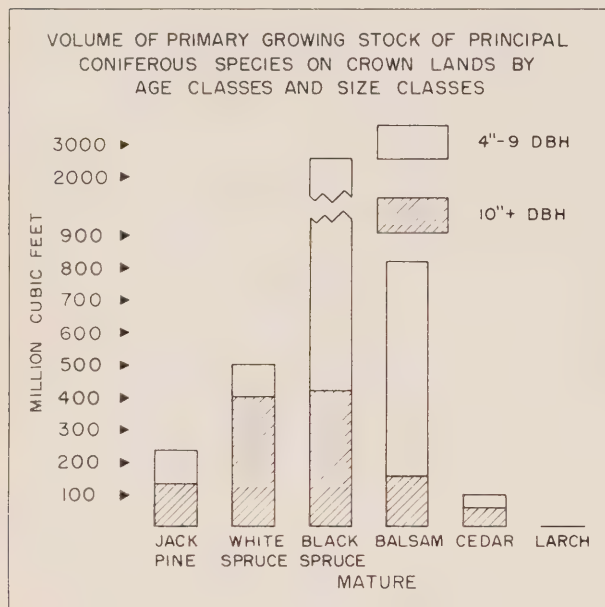


FIGURE 11

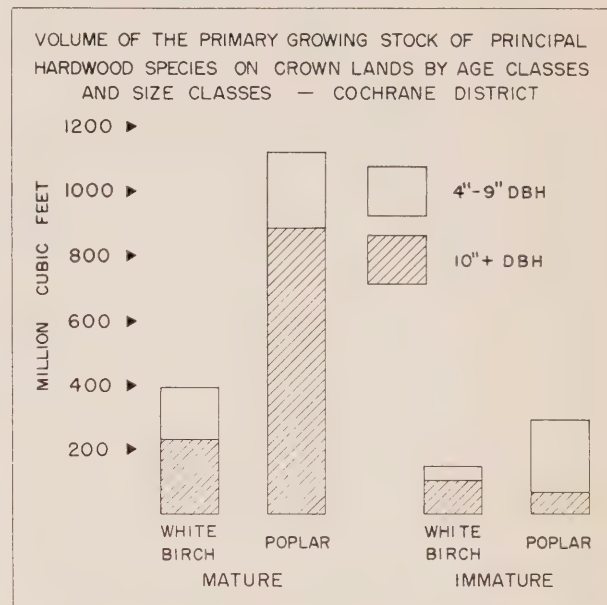


FIGURE 13

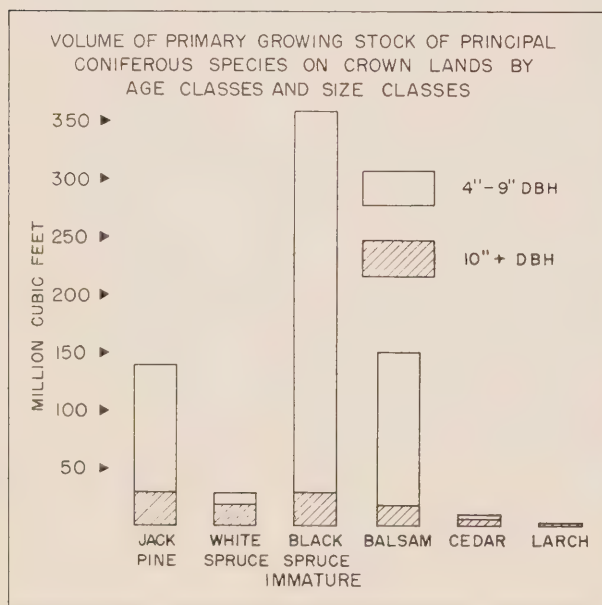


FIGURE 12



*Balsam seedlings surrounded by ground vegetation.*



TABLE 5.—Cubic foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Cochrane district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	3,399,320	1,213,415	558,967	91,107	5,262,809
Hardwood.....	71,992	160,297	188,759	31,136	452,184
Mixedwoods.....	802,859	1,205,488	389,396	134,933	2,532,676
TOTAL.....	4,274,171	2,579,200	1,137,122	257,176	8,247,669

ALL CONIFERS					
Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	3,302,842	917,471	531,160	72,286	4,823,759
Hardwood.....	21,711	13,143	14,343	4,203	53,400
Mixedwoods.....	501,943	371,862	187,744	55,976	1,117,525
TOTAL.....	3,826,496	1,302,476	733,247	132,465	5,994,684

ALL HARDWOODS					
Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	96,478	295,944	27,807	18,821	439,050
Hardwood.....	50,281	147,154	174,416	26,933	398,784
Mixedwoods.....	300,916	833,626	201,652	78,957	1,415,151
TOTAL.....	447,675	1,276,724	403,875	124,711	2,252,985

TABLE 6.—Cubic foot volumes of primary growing stock on Crown land in the Cochrane district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	3,055,634	1,108,767	510,927	86,102	4,761,430
Hardwood.....	57,339	123,245	144,928	26,483	351,995
Mixedwoods.....	732,539	1,099,426	328,206	123,274	2,283,445
TOTAL.....	3,845,512	2,331,438	984,061	235,859	7,396,870

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,964,892	855,588	484,899	68,419	4,373,798
Hardwood.....	17,308	9,872	12,546	3,777	43,503
Mixedwoods.....	464,769	352,305	159,138	52,051	1,028,263
TOTAL.....	3,446,969	1,217,765	656,583	124,247	5,445,564

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4" 9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	90,742	253,179	26,028	17,683	387,632
Hardwood.....	40,031	113,373	132,382	22,706	308,492
Mixedwoods.....	267,770	747,121	169,068	71,223	1,255,182
TOTAL.....	398,543	1,113,673	327,478	111,612	1,951,306

TABLE 7.—Cubic foot volumes of primary growing stock on patented land in the Cochrane district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total patented lands
	4"—9" d.b.h.	10" up d.b.h.	4"—9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	343,686	104,648	48,040	5,005	501,379
Hardwood.....	14,653	37,052	43,831	4,653	100,189
Mixedwoods.....	70,320	106,062	61,190	11,659	249,231
TOTAL.....	428,659	247,762	153,061	21,317	850,799

#### ALL CONIFERS

Cover type	Mature		Immature		Total patented lands
	4"—9" d.b.h.	10" up d.b.h.	4"—9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	337,950	61,883	46,261	3,867	449,961
Hardwood.....	4,403	3,271	1,797	426	9,897
Mixedwoods.....	37,174	19,557	28,606	3,925	89,262
TOTAL.....	379,527	84,711	76,664	8,218	549,120

#### ALL HARDWOODS

Cover type	Mature		Immature		Total patented lands
	4"—9" d.b.h.	10" up d.b.h.	4"—9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	5,736	42,765	1,779	1,138	51,418
Hardwood.....	10,250	33,781	42,034	4,227	90,292
Mixedwoods.....	33,146	86,505	32,584	7,734	159,969
TOTAL.....	49,132	163,051	76,397	13,099	301,679

TABLE 8.—Cubic foot volume of primary growing stock on productive forest lands in the Cochrane district by species and age classes in two size classes.

Species	Mature		Immature		Total all lands
	4"—9" d.b.h.	10" up d.b.h.	4"—9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
White pine.....	367	22,254	131	1,045	23,797
Red pine.....	253	4,041	.....	.....	4,294
Jack pine.....	110,988	138,576	166,805	38,609	454,978
White spruce.....	109,543	436,989	38,315	24,637	609,484
Black spruce.....	2,829,773	455,754	366,940	40,078	3,692,545
Balsam fir.....	728,157	175,971	147,063	21,629	1,072,820
White cedar.....	42,710	68,223	9,585	6,341	126,859
Larch.....	4,705	668	4,408	126	9,907
TOTAL CONIFERS	3,826,496	1,302,476	733,247	132,465	5,994,684
Yellow birch.....	246	1,397	.....	.....	1,643
White birch.....	181,497	258,174	121,389	46,257	607,317
Poplar (all).....	265,884	1,017,153	282,486	78,454	1,643,977
Red maple.....	48	.....	.....	.....	48
TOTAL HARDWOODS	447,675	1,276,724	403,875	124,711	2,252,985
TOTAL ALL SPECIES	4,274,171	2,579,200	1,137,122	257,176	8,247,669

TABLE 9.—Cubic foot volumes of primary growing stock on Crown land in the Cochrane district by species and age class in two size classes.

Species	Mature		Immature		Total Crown lands
	4"—9" d.b.h.	10" up d.b.h.	4"—9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
White pine.....	347	21,179	127	1,017	22,670
Red pine.....	235	3,788	.....	.....	4,023
Jack pine.....	104,885	136,257	145,429	37,013	423,584
White spruce.....	98,789	406,746	34,685	23,338	563,558
Black spruce.....	2,537,356	424,640	330,964	38,390	3,331,350
Balsam fir.....	662,949	160,804	133,371	18,665	975,789
White cedar.....	38,843	63,845	8,253	5,703	116,644
Larch.....	3,565	506	3,754	121	7,946
TOTAL CONIFERS	3,446,969	1,217,765	656,583	124,247	5,445,564
Yellow birch.....	235	1,332	.....	.....	1,567
White birch.....	164,686	227,978	106,982	42,510	542,156
Poplar (all).....	233,582	884,363	220,496	69,102	1,407,543
Red maple.....	40	.....	.....	.....	40
TOTAL HARDWOODS	398,543	1,113,673	327,478	111,612	1,951,306
TOTAL ALL SPECIES	3,845,512	2,331,438	984,061	235,859	7,396,870



TABLE 10. *Cubic foot volumes of primary growing stock on patented land in the Cochrane district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented lands
	4" 9" d.b.h.	10" up d.b.h.	4" 9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine	20	1,075	4	28	1,127
Red pine	18	253			271
Jack pine	6,103	2,319	21,376	1,596	31,394
White spruce	10,754	30,243	3,630	1,299	45,926
Black spruce	292,417	31,114	35,976	1,688	361,195
Balsam fir	65,208	15,167	13,692	2,964	97,031
White cedar	3,867	4,378	1,332	638	10,215
Larch	1,140	162	654	5	1,961
TOTAL CONIFERS	379,527	84,711	76,664	8,218	549,120
Yellow birch	11	65			76
White birch	16,811	30,196	14,407	3,747	65,161
Poplar (all)	32,302	132,790	61,990	9,352	236,434
Red maple	8				8
TOTAL HARDWOODS	49,132	163,051	76,397	13,099	301,679
TOTAL ALL SPECIES	428,659	247,762	153,061	21,317	850,799

### Allowable Cut

The calculations of the allowable cut have been carried out by means of a formula<sup>1</sup> using an appropriate rotation<sup>2</sup>. The amount of the annual allowable cut results directly from the volume of the primary growing stock and rotation age used for the different species encountered in the district. The present allowable cut figures like the volume of the primary growing stock may be on areas which, at the moment, are inaccessible to operations. The allowable cut volumes may likewise be in stands which due to low net yield are economically inoperable. Taking these conditions into account, the computed allowable cut is regarded as potential, rather than actually obtainable under present operating conditions.

Woods operations are being carried on each year and with present stands growing older, the size and structure of the primary growing stock will change. The calculation of the allowable cut based on the present volume of the primary growing stock is of value for a period of about ten years. On expiration of the initial ten year period the allowable cut should be calculated anew, based on the experience of the first ten year period and in conformity with the actual performance of the forest. With effective



*Pulpwood operations.*

<sup>1</sup> Methods of calculation of allowable cut are given in Appendix, methods, allowable cut, page 25.

<sup>2</sup> Rotation ages by species, table 16, page 25.



forestry practices, allowable cuts for the more valuable species will tend, almost certainly, to increase; without improved forestry practices the present trend to more and more poplar and white birch at the expense of the spruces will continue.

Patented lands are, on the average, being operated on a short rotation and in these circumstances the allowable cut for patented land has been calculated on a shorter rotation than for Crown lands of the district.

The annual allowable cut, or net depletion allowable under management in the Cochrane district is 187,834,205 cubic feet, 161,476,490 cubic feet from Crown lands and 26,357,715 cubic feet from patented lands. Of the total allowable cut, 86 per cent is on Crown lands and 14 per cent on patented lands.

#### CROWN LAND

The annual allowable cut for Crown land represents 2.18 per cent of the primary growing stock or 32.66 cubic feet per annum, per acre of the productive forest area. Of the total allowable cut, 95,966,175 cubic feet or 59 per cent is coniferous species and 65,510,315 cubic feet or 41 per cent is of hardwood species. Since the rotation age is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.8 per cent of the coniferous primary growing stock and 3.4 per cent for the hardwoods.

The annual allowable cut for the species making up

the coniferous content (table 11) shows that 65 per cent is white and black spruce, 21 per cent balsam fir, 12 per cent jack pine and 2 per cent other conifers. The relationship of the allowable cut for a ten year

TABLE 11.—Annual allowable cut for coniferous species on Crown lands in the Cochrane district.

Species	Annual allowable cut cu. ft.
White pine.....	354,215
Red pine.....	75,445
Jack pine.....	11,346,005
White spruce.....	10,566,720
Black spruce ..	52,052,345
Balsam fir.....	20,328,930
White cedar.....	1,093,535
Larch ..	148,980
<b>TOTAL CONIFERS.....</b>	<b>95,966,175</b>

period to the volume of the primary growing stock by species is shown graphically, figure 14.

The species making up the hardwood content (table 12) shows that about 81 per cent is poplar and another 19 per cent is white birch. Yellow birch and red maple appear in a negligible volume. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 15.

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 26,357,715 cubic feet, which represents 3.1 per cent of the primary growing stock, or 48.2 cubic feet per annum, per acre of the productive forest land. The annual allowable cut on patented lands is 2.4 per

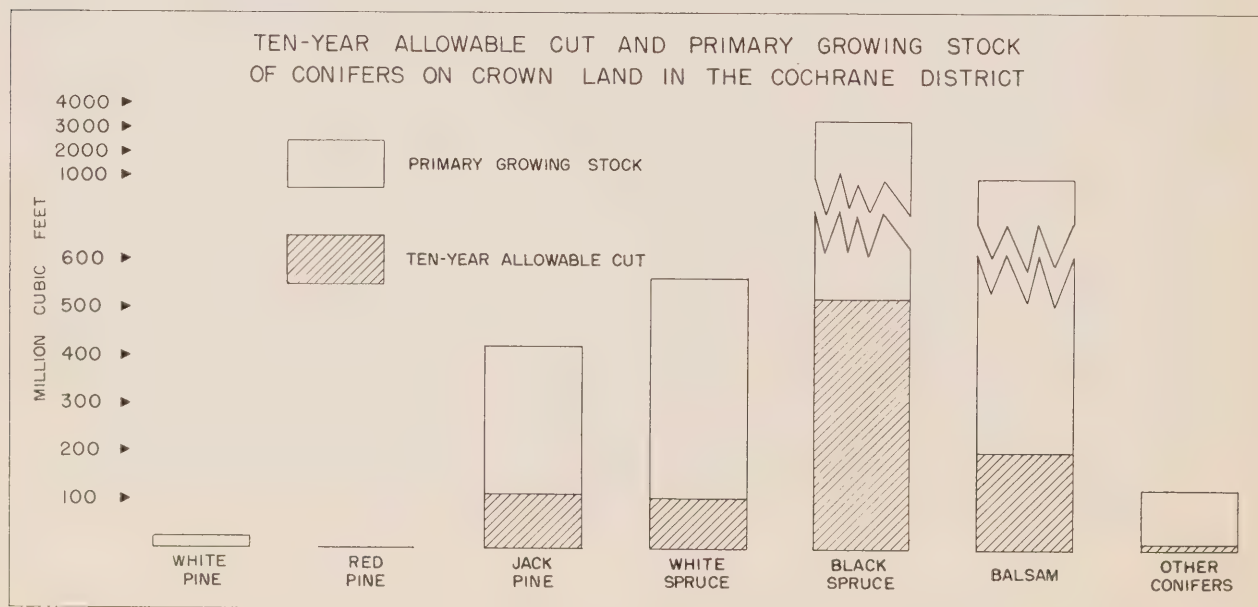


FIGURE 14

cent of the primary growing stock for conifers and 4.3 per cent for hardwoods. The justification for cutting annually over four per cent of the primary growing stock of hardwoods is to be attributed to the short rotation of forty years on which it is proposed to manage the large areas of poplar stands.

The annual allowable cut for coniferous species on patented lands is 13,237,025 cubic feet and for hardwoods, 13,120,690 cubic feet. About one-half

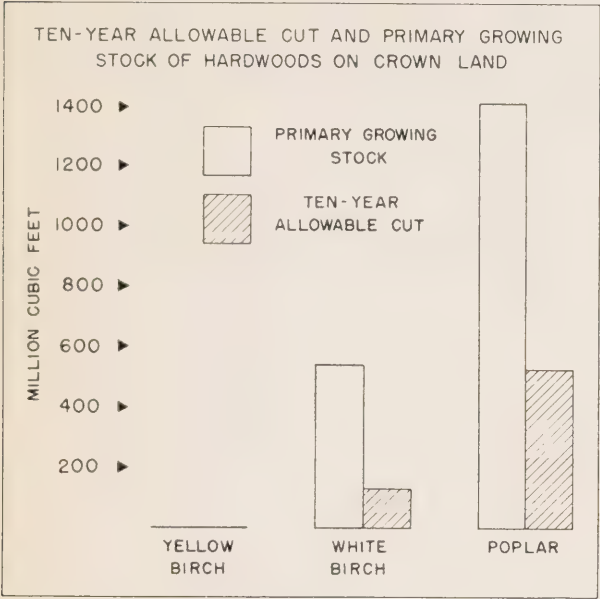


FIGURE 15

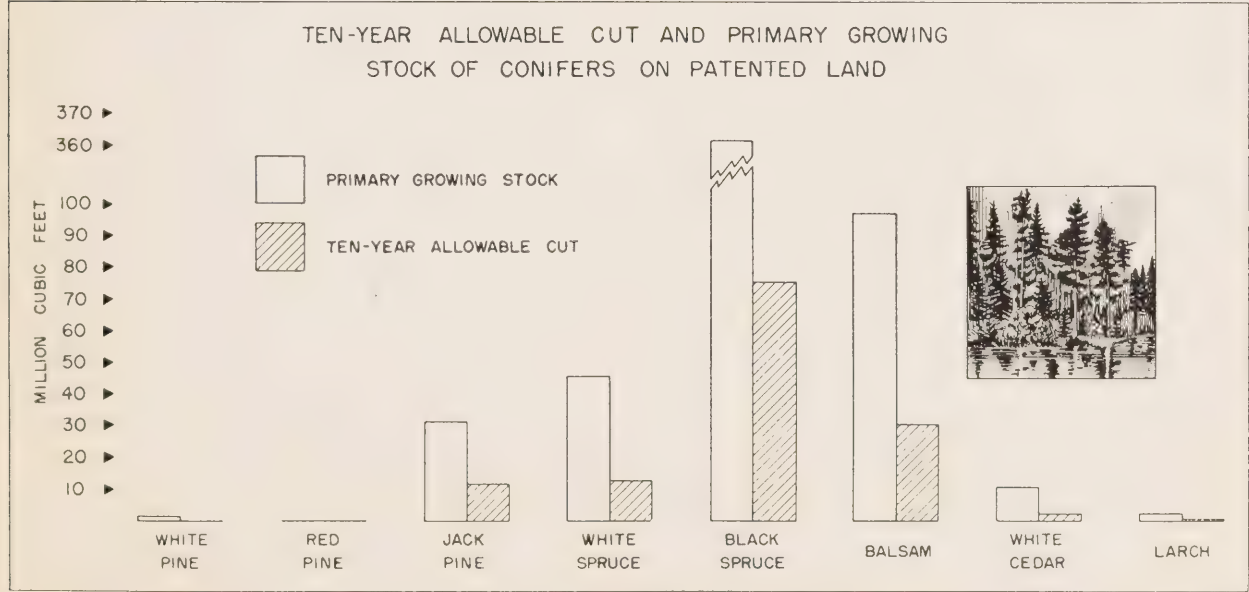


FIGURE 16

TABLE 12.—Annual allowable cut for hardwood species on Crown land.

Species	Annual allowable cut cu. ft.
Yellow birch	19,580
White birch	12,706,790
Poplar	52,782,880
Red maple	1,065
<b>TOTAL HARDWOODS</b>	<b>65,510,315</b>

of the allowable cut is for the two intolerant hardwood species, poplar and white birch, which together contribute 13,119,105 cubic feet to the total allowable cut. For the coniferous species, spruce is most important, contributing 8,755 thousand cubic feet. Balsam fir is next in importance, followed by jack pine and other conifers (figs. 16 and 17).

TABLE 13.—Annual allowable cut for all species on patented lands.

Species	Annual allowable cut cu. ft.
White pine.....	23,485
Red pine.....	8,465
Jack pine.....	1,177,270
White spruce.....	1,230,170
Black spruce.....	7,524,890
Balsam fir.....	3,032,210
White cedar.....	191,530
Larch.....	49,005
<b>TOTAL CONIFERS.....</b>	<b>13,237,025</b>
Yellow birch.....	1,200
White birch.....	2,036,280
Poplar.....	11,082,825
Red maple.....	385
<b>TOTAL HARDWOODS.....</b>	<b>13,120,690</b>

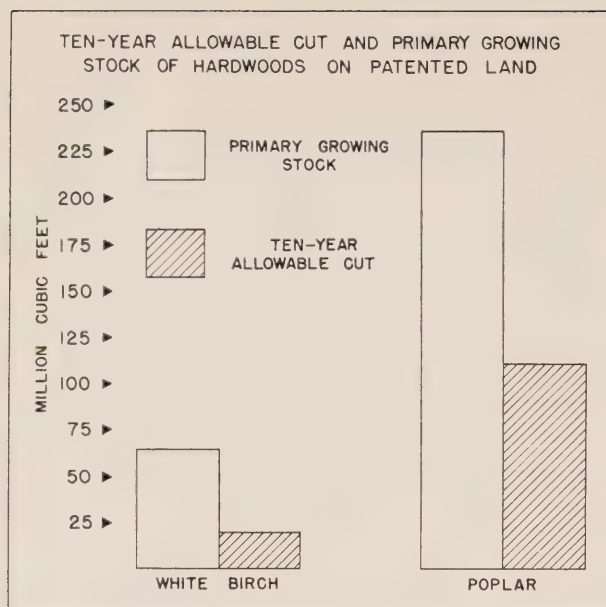


FIGURE 17

#### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Return for the year ending March 31, 1949<sup>1</sup>, wood and forest products were cut on Crown lands in the Cochrane district as follows:

Pulpwood.....	308,482 cords
Logs and booms.....	15,433,495 F.B.M. Doyle rule
Piling.....	2,241,777 cubic feet
Poles and posts.....	8,259 pieces
Pit props.....	5,591 cords
Fuelwood.....	14,815 cords

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet and are comparable with the figures for allowable cut (table 14).

TABLE 14.—Gross total cubic volume of wood utilized annually in the Cochrane district.

Species	Wood utilized cu. ft.	Total per cent
Pine, white and red.....	164,493	0.3
Jack pine.....	9,263,001	19.2
Spruce, white and black.....	35,019,888	72.4
Balsam fir.....	2,516,780	5.2
Cedar.....	15,311	...
<b>TOTAL CONIFERS.....</b>	<b>46,979,473</b>	<b>97.1</b>
Birch.....	302,201	0.7
Poplar.....	1,079,848	2.2
<b>TOTAL HARDWOODS.....</b>	<b>1,382,049</b>	<b>2.9</b>
<b>TOTAL.....</b>	<b>48,361,522</b>	

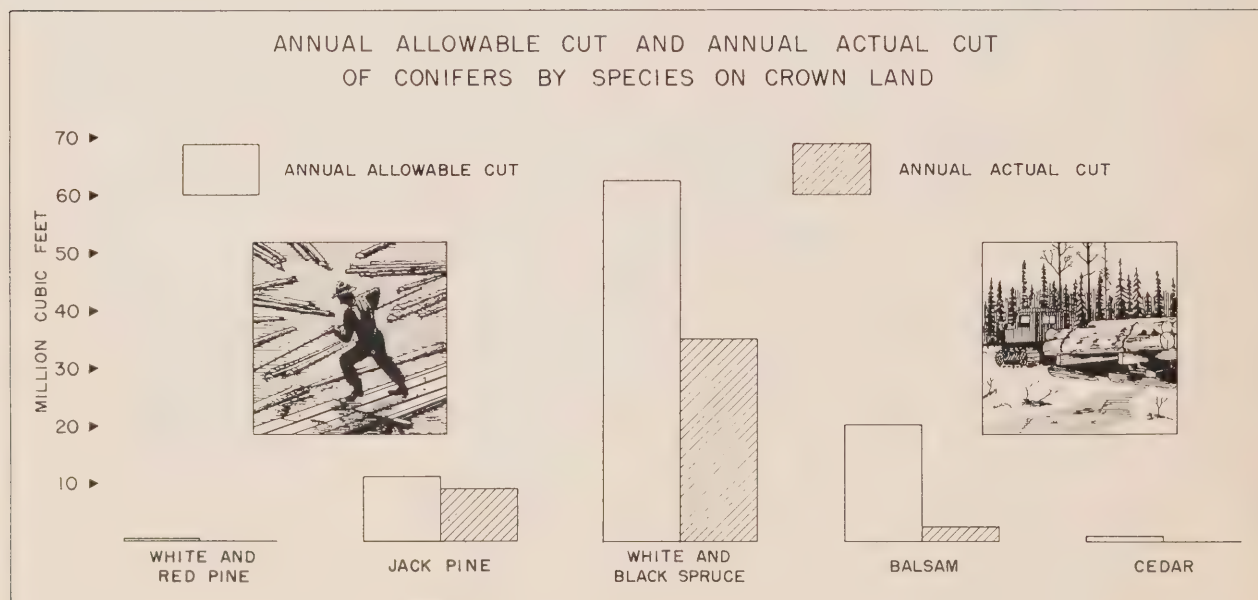


FIGURE 18

<sup>1</sup> Report of the Minister of Lands and Forests for the Province of Ontario for the fiscal year ending March 31, 1950.



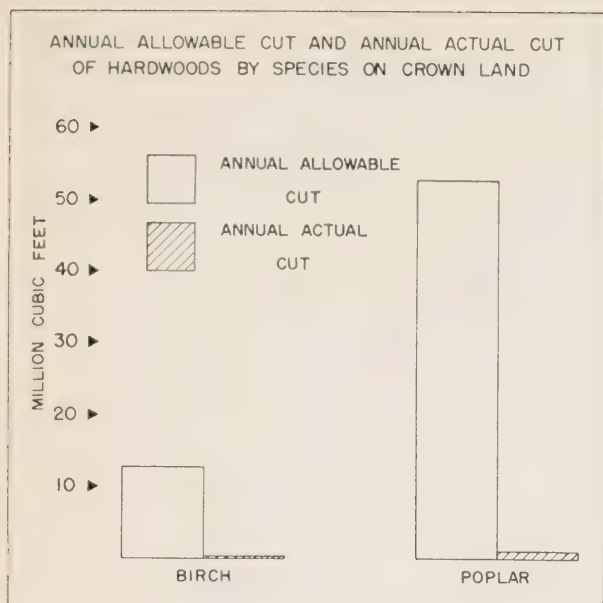


FIGURE 19

A comparison of the annual allowable cut with the actual cut by species (table 15) indicates that utilization of all species was less than the allowable cut (fig. 18). The cut of conifers was 49 per cent of the allowable cut, only 2 per cent of the allowable cut for

hardwood species was utilized. Excessive volumes of poplar and white birch remain unutilized on Crown lands in the Cochrane district (fig. 19).

There are no available records on the quantity of timber utilized from patented lands in the Cochrane district and, consequently, no comparison of the allowable with the annual actual cut is made.

TABLE 15.—Comparison of allowable cut with actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red.....	430	165
Jack pine.....	11,346	9,263
Spruce, white and black.....	62,619	35,020
Balsam fir.....	20,329	2,517
Cedar.....	1,093	15
Larch.....	149	
<b>TOTAL CONIFERS.....</b>	<b>95,966</b>	<b>46,980</b>
Birch.....	12,726	302
Poplar.....	52,783	1,080
Others.....	1	
<b>TOTAL HARDWOODS.....</b>	<b>65,510</b>	<b>1,382</b>
<b>TOTAL.....</b>	<b>161,476</b>	<b>48,362</b>



Train of timber.



Compass man on survey work.

# APPENDIX

## *Survey Methods*

● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs, 9 inches by 9 inches, are taken by a camera with a 6-inch focal length from 7,920 feet above mean ground level. This provides photographs at a scale of four inches to the mile (1/15,840) which is the same scale used in mapping. The Slotted Templet Method is used to produce planimetric base maps. Each map sheet covers 7.5 minutes of latitude by fifteen minutes of longitude, approximately 100 square miles. Forested areas are now separated on stereoscopic pairs of photographs and transferred to the base map.

This map is taken to the field as an aid in carrying out the sampling necessary to obtain data for volume estimates. On the completion of field work the data collected is used as an aid in typing. The forest type maps are now prepared and areas determined by the usual methods.

Volume and stock tables are now prepared for each ecological section encountered. The stock

tables are prepared for each cover type, coniferous, hardwood and mixedwoods. Each of these is separated into two age classes, mature and immature. Each age class is divided into four density classes. The volume per acre for each species, divided into 4-9 inch diameter class and 10 inches and up diameter class, is shown for each cover type, age class and density class. These summaries were made separately for two of the three sections found in the Cochrane district. Too few samples were obtained in the Coastal Plain section, and the Clay Belt section tables were applied to it. The per acre volumes in cubic feet, made up in this manner, are shown in tables 18 and 19.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. This data is combined with that gathered by the Department of Lands and Forests and the totals thus obtained are used in preparing this report. The areas surveyed by licensees in the Cochrane district are shown in figure 20.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment for Crown land is 25 cubic feet per acre, and for patented land is 39 cubic feet per acre. The district average is 26 cubic feet per acre per annum. These figures should be regarded as approximate, since only the mature age class was considered in the calculation.

## *Age Classes*

The age classes, in their present form, do not permit of the usual method of arriving at sustained yield because there is no figure for area by species and each age class represents quite a range in years. The immature age class may have an age range from 10 to 120 years, the mature age class from 30 to 200 years, depending upon the species. Therefore, no normal area for each age class can be calculated.

## *Rotation*

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class

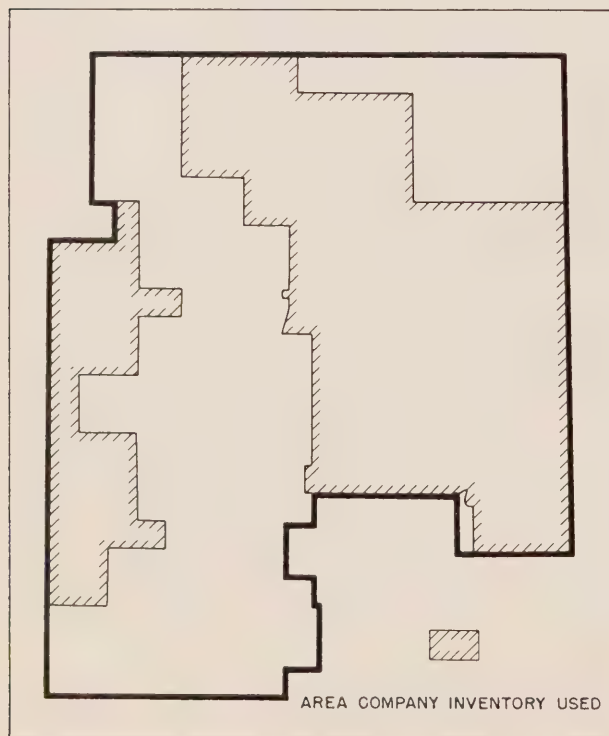


FIGURE 20

Ib<sup>1</sup> were used as rotation ages for all species encountered except jack pine, where a rotation age of seventy years has been accepted as more suitable than that of sixty years (table 16).

TABLE 16.—*Rotation ages by species.*

Species	Crown land <i>years</i>	Patented land <i>years</i>
White pine.....	120	90
Red pine.....	100	60
Jack pine.....	70	50
White spruce.....	100	70
Black spruce.....	120	90
Balsam fir.....	90	60
White cedar.....	200	100
Larch.....	100	75
White birch.....	80	60
Poplar (all).....	50	40

In calculations of allowable cut, a higher rotation for Crown land was used than that for patented land. The adoption of the lower rotation in the case of patented land is based on the assumption that there is a general trend among woodlot owners to lower the maturity age and to cut larger amounts of wood of smaller size, rather than produce high quality timber suitable for sawlogs.

#### *Allowable Cut*

##### (a) METHOD

The following two bases were available for calculation of allowable cut: (1) the volumes of the mature and immature age classes for each species, and (2) the adopted rotation ages.

The compilation was carried out in such a way that the volumes were shown by species, separately, rather than for the total growing stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>2</sup> was considered and found to be satisfactory for the following reasons: (1) The ratio of the volume per acre of mature to immature age class actually has been found, so far in Ontario, to be approximately 5/3 required by the French method. (2) In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. (3) The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends towards building

up a normal growing stock, and the results of calculations may be considered rather conservative.

##### (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

V.1.—denotes volume of mature timber (Age Class I)  
V.2.—denotes volume of immature timber (Age Class II)  
n —rotation  
P —annual allowable cut

With the aid of the formula, allowable cut has been calculated for each species, separately, with full consideration of the actual growing stock of each species and the proper rotation. Thus all uncertain assumptions, such as an average rotation for all species, or on species content of the allowable cut calculated in one figure only for the whole district, have been eliminated.

The results of individual calculations for each species have been totalled and shown as allowable cut for Crown and patented land, respectively.

#### *Cull Factor*

The cull factors (table 17) used in this report, where it was found necessary, either to calculate net merchantable volumes, or calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, were taken from the figures for defect made available from operations being carried out in the district.

TABLE 17.—*Cull factors by species, Cochrane district.*

Species	Cull <i>per cent</i>
Pine, white and red	30
Jack pine	14
Spruce, white and black	10
Balsam fir	38
Cedar	25
White birch	38
Poplar	37

According to the practice of scaling and measuring timber cut from Crown lands in the Province of Ontario, a cull log measured in board feet contains less than one-third the total volume in sound wood. When a pulpwood block or log is measured in cubic feet and shows more than one-half the volume defective it is considered a cull piece.

<sup>1</sup> Manual of Timber Management, Dept. of Lands and Forests, Ontario Part II, page 50.

<sup>2</sup> "Le traité pratique d'aménagement des forêts"—L. Parlé, 1930, Paris.



TABLE 18. — *Volume of the primary growing stock in cubic feet per acre*  
*Central Transition Section — 1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9'' 10'' up	3.3 160.6	3.2 159.0	3.1 149.7	4.5 220.4	..... .....	..... .....	..... .....	..... .....
Red pine.....	4''-9'' 10'' up	5.3 61.2	5.3 60.5	5.0 57.0	..... .....	..... .....	..... .....	..... .....	..... .....
Jack pine.....	4''-9'' 10'' up	372.9 372.9	369.0 368.9	347.7 347.8	108.3 342.9	618.6 61.2	609.2 60.3	564.2 55.8	199.5 24.7
White spruce.....	4''-9'' 10'' up	53.8 74.4	53.3 73.6	50.2 69.4	72.0 72.1	45.1 14.3	44.5 14.0	41.2 13.0	44.9 21.1
Black spruce.....	4''-9'' 10'' up	654.5 134.0	647.6 132.6	610.4 125.0	226.5 88.1	601.9 31.7	592.8 31.2	549.0 28.9	255.7 41.6
Balsam fir.....	4''-9'' 10'' up	75.6 7.5	74.8 7.4	70.5 7.0	51.1 3.3	60.1 5.9	59.2 5.8	54.8 5.4	46.1 .....
White cedar.....	4''-9'' 10'' up	89.3 145.8	88.4 144.2	83.3 136.0	52.4 75.5	23.0 16.6	22.6 16.4	20.9 15.2	104.7 18.5
Larch.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	28.2 1.5	27.8 1.5	25.7 1.4	..... .....
TOTAL CONIFERS.....	4''-9'' 10'' up	1254.7 956.4	1241.6 946.2	1170.2 891.9	514.8 802.3	1376.9 131.2	1356.1 129.2	1255.8 119.7	650.9 105.9
White birch.....	4''-9'' 10'' up	56.7 50.2	56.1 49.7	52.8 46.9	49.5 84.3	62.1 25.4	61.1 25.0	56.7 23.1	17.6 20.6
Poplar (all).....	4''-9'' 10'' up	20.5 36.5	20.3 36.1	19.2 34.0	8.0 11.1	34.3 20.1	33.8 19.8	31.3 18.4	..... .....
TOTAL HARDWOODS.....	4''-9'' 10'' up	77.2 86.7	76.4 85.8	72.0 80.9	57.5 95.4	96.4 45.5	94.9 44.8	88.0 41.5	17.6 20.6
GRAND TOTAL.....	4''-9'' 10'' up	1331.9 1043.1	1318.0 1032.0	1242.2 972.8	572.3 897.7	1473.3 176.7	1451.0 174.0	1343.8 161.2	668.5 126.5
TOTAL 4'' UP.....		2375.0	2350.0	2215.0	1470.0	1650.0	1625.0	1505.0	795.0

		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9'' 10'' up	23.8 53.1	22.6 50.3	19.4 43.2	..... .....	48.8 76.2	44.1 68.9	33.9 53.1	..... .....
White spruce.....	4''-9'' 10'' up	53.3 60.2	50.6 57.0	43.4 49.0	..... .....	21.0 14.0	19.0 12.6	14.6 9.8	..... .....
Black spruce.....	4''-9'' 10'' up	27.4 9.2	26.0 8.7	22.4 7.4	..... .....	23.7 3.8	21.4 3.5	16.4 2.7	20.7 .....
Balsam fir.....	4''-9'' 10'' up	27.1 9.5	25.7 9.0	22.1 7.7	24.5 .....	27.9 2.1	25.2 1.9	19.4 1.5	..... .....
TOTAL CONIFERS.....	4''-9'' 10'' up	131.6 132.0	124.9 125.0	107.3 107.3	24.5 .....	121.4 96.1	109.7 86.9	84.3 67.1	20.7 .....
White birch.....	4''-9'' 10'' up	553.1 285.0	524.4 270.2	450.4 232.0	325.7 554.6	483.8 106.2	437.4 96.0	336.7 73.9	185.8 14.0
Poplar (all).....	4''-9'' 10'' up	639.6 1918.7	606.4 1819.1	520.8 1562.2	240.9 536.1	1337.1 355.4	1208.7 321.3	930.6 247.4	543.6 135.9
Red maple.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	68.2 .....	..... .....	..... .....	..... .....	..... .....
TOTAL HARDWOODS.....	4''-9'' 10'' up	1192.7 2203.7	1130.8 2089.3	971.2 1794.2	634.8 1090.7	1820.9 461.6	1646.1 417.3	1267.3 321.3	729.4 149.9
GRAND TOTAL.....	4''-9'' 10'' up	1324.3 2335.7	1255.7 2214.3	1078.5 1901.5	659.3 1090.7	1942.3 557.7	1755.8 504.2	1351.6 388.4	750.1 149.9
TOTAL 4'' UP.....		3660.0	3470.0	2980.0	1750.0	2500.0	2260.0	1740.0	900.0

TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	5.9 189.2	5.6 182.2	5.2 168.5	..... 433.2	1.5 12.0	1.4 11.1	1.1 8.9	
Red pine.....	4"-9" 10" up	0.4 36.2	0.4 34.8	0.3 32.3	.....				
Jack pine.....	4"-9" 10" up	167.5 311.0	161.2 299.4	149.1 277.0	.....	279.3 164.0	259.4 152.3	206.9 121.5	72.6 42.6
White spruce.....	4"-9" 10" up	95.5 169.7	91.9 163.4	85.0 151.1	44.8 234.9	103.9 55.9	96.5 51.9	77.0 41.4	51.5 30.2
Black spruce.....	4"-9" 10" up	138.0 51.0	132.8 49.1	122.9 45.4	21.6 64.6	215.8 11.4	209.5 10.6	160.0 8.4	80.6 13.1
Balsam fir.....	4"-9" 10" up	103.8 21.2	99.8 20.5	92.4 18.9	130.2 21.2	94.1 7.1	87.5 6.6	69.8 5.2	40.4 3.5
White cedar.....	4"-9" 10" up	18.5 39.4	17.8 37.9	16.5 35.1	41.9 132.6	10.3 7.7	9.5 7.2	7.6 5.7	
TOTAL CONIFERS.....	4"-9" 10" up	529.6 817.7	509.5 787.3	471.4 728.3	238.5 886.5	704.9 258.1	654.8 239.7	522.4 191.1	245.1 89.4
Yellow birch.....	4"-9" 10" up	6.9 38.8	6.6 37.4	6.1 34.6	.....	.....	.....	.....	
White birch.....	4"-9" 10" up	452.5 254.6	435.6 245.1	402.9 226.7	254.1 381.1	480.1 91.4	446.0 84.9	355.7 67.7	197.6 88.8
Poplar (all).....	4"-9" 10" up	237.0 710.9	228.1 684.4	211.0 633.0	181.7 161.1	515.2 200.3	478.5 186.1	381.7 148.4	165.0 74.1
TOTAL HARDWOODS.....	4"-9" 10" up	696.4 1004.3	670.3 966.9	620.0 894.3	435.8 542.2	995.3 291.7	924.5 271.0	737.4 216.1	362.6 162.9
GRAND TOTAL.....	4"-9" 10" up	1226.0 1822.0	1179.8 1754.2	1091.4 1622.6	674.3 1428.7	1700.2 549.8	1579.3 510.7	1259.8 407.2	607.7 252.3
TOTAL 4" UP.....		3048.0	2934.0	2714.0	2103.0	2250.0	2090.0	1667.0	860.0



Black spruce stand.

TABLE 19. — *Volume of the primary growing stock in cubic feet per acre*  
*Clay Belt Section — 1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	27.1	25.9	22.8	.....	345.6	334.4	289.9	207.2
	10'' up	3.3	3.2	2.8	.....	14.4	13.9	12.1	8.6
White spruce.....	4''-9''	26.8	25.7	22.6	.....	35.8	54.0	46.8	.....
	10'' up	107.3	103.0	90.6	.....	38.8	37.6	32.6	.....
Black spruce.....	4''-9''	1563.2	1500.2	1319.1	626.0	828.4	801.4	695.2	224.9
	10'' up	154.6	148.4	130.5	93.5	43.6	42.2	36.6	11.8
Balsam fir.....	4''-9''	280.6	269.2	236.7	186.2	202.8	196.2	170.2	59.0
	10'' up	53.4	51.3	45.1	.....	8.4	8.2	7.1	2.5
White cedar.....	4''-9''	15.0	14.4	12.7	126.2	26.5	25.6	22.2	83.2
	10'' up	12.8	12.3	10.8	244.9	12.4	12.0	10.4	39.1
Larch.....	4''-9''	6.7	6.4	5.6	.....	22.0	21.3	18.4	.....
	10'' up	0.9	0.9	0.8	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	1919.4	1841.8	1619.5	938.4	1481.1	1432.9	1242.7	574.3
	10'' up	332.3	319.1	280.6	338.4	117.6	113.9	98.8	62.0
White birch.....	4''-9''	10.9	10.4	9.2	.....	40.6	39.2	34.0	.....
	10'' up	72.6	69.7	61.3	.....	10.1	9.8	8.5	.....
Poplar (all).....	4''-9''	19.5	18.7	16.4	53.2	15.0	14.5	12.6	6.5
	10'' up	175.3	168.3	148.0	.....	25.6	24.7	21.4	11.2
TOTAL HARDWOODS.....	4''-9''	30.4	29.1	25.6	53.2	55.6	53.7	46.6	6.5
	10'' up	247.9	238.0	209.3	.....	35.7	34.5	29.9	11.2
GRAND TOTAL.....	4''-9''	1949.8	1870.9	1645.1	991.6	1536.7	1486.6	1289.3	580.8
	10'' up	580.2	557.1	489.9	338.4	153.3	148.4	128.7	73.2
TOTAL 4'' UP.....		2530.0	2428.0	2135.0	1330.0	1690.0	1635.0	1418.0	654.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	.....	.....	.....	.....	6.0	5.8	5.2	2.7
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
White spruce.....	4''-9''	77.5	75.6	68.8	39.5	4.5	4.4	3.9	2.0
	10'' up	180.9	176.3	160.4	92.3	.....	.....	.....	.....
Black spruce.....	4''-9''	108.2	105.6	96.1	55.2	15.1	14.7	13.0	6.7
	10'' up	27.1	26.4	24.0	13.8	2.9	2.8	2.5	1.3
Balsam fir.....	4''-9''	172.3	167.9	152.8	87.9	26.8	26.0	23.1	11.9
	10'' up	57.4	56.0	50.9	29.3	1.7	1.7	1.5	0.8
White cedar.....	4''-9''	3.0	2.9	2.6	1.5	.....	.....	.....	.....
	10'' up	1.1	1.1	1.0	0.6	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	361.0	352.0	320.3	184.1	52.4	50.9	45.2	23.3
	10'' up	266.5	259.8	236.3	136.0	4.6	4.5	4.0	2.1
White birch.....	4''-9''	291.2	284.0	258.3	148.6	103.5	100.6	89.3	46.0
	10'' up	291.1	283.9	258.3	148.5	9.0	8.8	7.8	4.0
Poplar (all).....	4''-9''	491.5	479.3	436.0	250.7	1237.4	1203.6	1068.3	550.2
	10'' up	2399.7	2340.0	2128.8	1224.1	93.1	90.6	80.4	41.4
TOTAL HARDWOODS.....	4''-9''	782.7	763.3	694.3	399.3	1340.9	1304.2	1157.6	596.2
	10'' up	2690.8	2623.9	2387.1	1372.6	102.1	99.4	88.2	45.4
GRAND TOTAL.....	4''-9''	1143.7	1115.3	1014.6	583.4	1393.3	1355.1	1202.8	619.5
	10'' up	2957.3	2883.7	2623.4	1508.6	106.7	103.9	92.2	47.5
TOTAL 4'' UP.....		4101.0	3999.0	3638.0	2092.0	1500.0	1459.0	1295.0	667.0



(TABLE 19 Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4'-9'' 10'' up	.....	.....	.....	.....	325.9 10.1	304.4 9.4	256.7 7.9	.....
White spruce.....	4'-9'' 10'' up	128.2 238.1	126.8 235.5	113.5 210.8	.....	60.0	56.0	47.3	.....
Black spruce.....	4'-9'' 10'' up	388.9 85.4	384.7 84.5	344.4 75.6	224.9	222.7 9.3	208.0 8.7	175.4 7.3	266.5
Balsam fir.....	4'-9'' 10'' up	323.9 138.8	320.4 137.3	286.8 122.9	104.7	165.6 64.4	154.7 60.1	130.4 50.7	156.0 60.7
White cedar.....	4'-9'' 10'' up	5.9 5.7	5.8 5.6	5.2 5.0	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4'-9'' 10'' up	846.9 468.0	837.7 462.9	749.9 414.3	329.6	774.2 83.8	723.1 78.2	609.8 65.9	422.5 60.7
White birch.....	4'-9'' 10'' up	263.6 349.5	260.8 345.6	233.4 309.4	.....	192.6 21.4	179.9 20.0	151.7 16.8	144.4 109.0
Poplar (all).....	4'-9'' 10'' up	404.9 1523.1	400.5 1506.5	358.5 1348.5	515.0 1094.4	835.2 92.8	780.1 86.7	657.7 73.1	90.4 115.0
TOTAL HARDWOODS.....	4'-9'' 10'' up	668.5 1872.6	661.3 1852.1	591.9 1657.9	515.0 1094.4	1027.8 114.2	960.0 106.7	809.4 89.9	234.8 224.0
GRAND TOTAL.....	4'-9'' 10'' up	1515.4 2340.6	1499.0 2315.0	1341.8 2072.2	844.6 1094.4	1802.0 198.0	1683.1 184.9	1419.2 155.8	657.3 284.7
TOTAL 4'' UP.....		3856.0	3814.0	3414.0	1939.0	2000.0	1868.0	1575.0	942.0

Common and Botanical Names of Tree Species  
included in Timber Estimates.

CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill.) B.S.P.

Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

HARDWOODS

Yellow birch.....	<i>Betula lutea</i> Michx. f.
White birch.....	<i>Betula papyrifera</i> Marsh.
Red maple.....	<i>Acer rubrum</i> L.
Poplar.....	<i>Populus tremuloides</i> Michx. <i>Populus tacamahacca</i> Mill.

## *Notes*

---

## *Notes*

---



## *Notes*

---





**Hon. Welland S. Gemmell**

*Minister*

**F. A. MacDougall**

*Deputy Minister*



Report No. 4 of the  
**KAPUSKASING DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management  
Ontario Department of Lands and Forests



# *Forest Resources Inventory*

— 1953 —

Report No. 4 of the  
KAPUSKASING DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests



# PREFACE

● One of the important undertakings of the Department of Lands and Forests in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to the Province, one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources of the Province, the Department of Lands and Forests has set up twenty-two districts, which constitute the field administrative units of the Department. The forest resources inventory covers sixteen of these districts and parts of two additional districts. The inventory covers the accessible forest area of Ontario, totalling 172,000 square miles. This report deals with the results of the inventory in the Kapuskasing district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and to community welfare, and to the industrial and commercial development of the province as a whole. This objective is being given material effect through the use of the inventory data in the preparation of long term timber management plans.



# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	VOLUME.....	14
FOREST INVENTORY.....	9	CONIFERS VS. HARDWOODS.....	14
BACKGROUND OF THE REPORT.....	9	SAWLOGS VS. PULPWOOD.....	16
AREAS.....	9	ALLOWABLE CUT.....	20
FOREST LAND OWNERSHIP.....	10	UTILIZATION VS. ALLOWABLE CUT.....	22
AGE CLASSES.....	11	APPENDIX.....	24
REGIONAL FOREST TYPES.....	11	SURVEY METHODS.....	24
COVER TYPES.....	12	ROTATION.....	24
		ALLOWABLE CUT.....	24
		CULL FACTOR.....	25

## FIGURES

FIG. 1 — KAPUSKASING DISTRICT, 1951.....	9	FIG. 12 — VOLUME OF PRIMARY GROWING STOCK OF CONIFERS ON CROWN LANDS — MATURE AGE CLASS.....	17
FIG. 2 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES.....	10	FIG. 13 — VOLUME OF PRIMARY GROWING STOCK OF CONIFERS ON CROWN LANDS — IMMATURE AGE CLASS.....	17
FIG. 3 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO AGE CLASSES.....	11	FIG. 14 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOOD SPECIES ON CROWN LAND BY AGE CLASSES AND SIZE CLASSES.....	17
FIG. 4 — ECOLOGICAL DIVISIONS.....	12	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE KAPUSKASING DISTRICT.....	21
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	13	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND.....	21
FIG. 6 — VOLUME OF THE PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	14	FIG. 17 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LAND.....	22
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	15	FIG. 18 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LAND.....	22
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LANDS BY SPECIES AND AGE CLASSES.....	15	FIG. 19 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS BY SPECIES ON CROWN LANDS.....	23
FIG. 9 — VOLUME OF THE PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LANDS BY SIZE CLASSES.....	16	FIG. 20 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF HARDWOODS BY SPECIES ON CROWN LAND.....	23
FIG. 10 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	16	FIG. 21 — AREA COMPANY INVENTORY USED.....	24
FIG. 11 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LANDS BY SIZE CLASSES.....	16		





# SURVEY HIGHLIGHTS

1. The Kapuskasing district lies in the Clay Belt region of Ontario, an area of deep clay, highly productive soils on which the finest pulpwood forests in the province grow. Industrial development of the district based almost wholly on the pulpwood resources is only a little over 25 years old. The forests of the district are predominantly mature virgin stands of black spruce, modified locally and to a limited extent by agricultural settlement. White spruce grows to large sizes on the well-drained soils along river and stream valleys and in the mixed upland forests. From these stands a small but thriving sawmilling industry derives supplies of timber.

2. The total area of the Kapuskasing district is 10,394,309 acres or 16,241 square miles. Productive forest lands occupy 8,061,696 acres, 77 per cent of the total area. Water covers 4 per cent of the total area and 19 per cent is made up almost wholly of non-productive forest lands.

3. Patented lands cover 10 per cent of the total area leaving the major portion in Crown ownership.

4. The total timber resources of the district are over 13 billion cubic feet, 67 per cent is of the valuable

coniferous species and 33 per cent hardwoods. Black spruce is the most important species making up about two-thirds of the conifer volume on Crown lands.

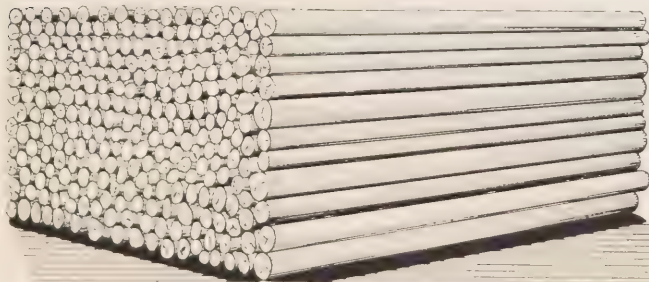
5. The annual allowable cut on Crown lands is 91 million cubic feet for conifers and 86 million cubic feet for hardwoods before any deductions are made for losses in growing stock from sources other than industrial utilization.

6. Of all wood utilized from Crown lands in the Kapuskasing district, 86 per cent is spruce. Spruce, however, makes up only 37 per cent of the total allowable cut.

7. A comparison of the annual allowable cut with the actual utilization of timber for Crown lands shows that no species is being overcut at the present time. Spruce with an allowable cut of 66 million cubic feet, and an actual cut of 53 million cubic feet has a narrow balance to provide for losses due to fire and other causes. All other species are being utilized well within their allowable cut with a very large surplus of poplar and white birch unused at the present time.

## CONIFERS ON CROWN LAND - KAPUSKASING DISTRICT

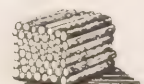
PRIMARY GROWING STOCK 11.3 BILLION CUBIC FEET



ANNUAL  
ALLOWABLE  
CUT  
91.3 MILLION  
CUBIC  
FEET



ANNUAL  
ACTUAL  
CUT  
59.8 MILLION  
CUBIC  
FEET





MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50

MARCH, 1953



*Forest resources inventory photograph of Town of Kapuskasing taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## *Background of the Report*

● The major portion of the Kapuskasing district lies in the Clay Belt region of Ontario, an area of fertile clay soils of varying depths, potentially valuable for agricultural pursuits. Up to the present time agricultural settlement has been localized along the railroads and the one highway traversing the district from east to west. All of the interior lands of the district are devoted to forestry purposes. Beginning somewhat south of the trans-continental line of the Canadian National Railway and extending northward, the clay soils carry a great deal of fine rock particles, along with pebbles and boulders and are less attractive for agricultural use.

The surface of the area is an undulating plain, the shallow depressions mostly occupied by swamps and peat bogs. In contrast to the "Canadian Shield" area, lakes are relatively few in number and often shallow with low clay shorelines. The waters of the rivers, all flowing northward to James bay are frequently muddy, due to the large amount of clay materials which are collected and carried, in the absence of broad lake expansions along the river courses.

The special character of the soil and drainage is reflected in the tree species and in the development of the forest. Black spruce the premier pulpwood species of the province reaches its finest development in the Clay Belt region, growing in almost pure stands, of high yields, on all of the lower ground and extending up the gentle slopes. With but a moderate rise in the general level of the land the forest composition changes from pure spruce forest to a mixture of poplar, white birch, black and white spruce and balsam fir. Jack pine occurs regularly on light sandy soils but finds unfavourable conditions on the deep clays. White and red pine occur only as isolated patches. Approaching the northern boundary of the district, the consolidated stands of spruce become broken up by areas of muskeg, and scrub growth of spruce becomes more widespread, gradually blending into the extensive areas of bogs and muskegs of the Coastal Plain surrounding Hudson and James bay.

The forests of the Kapuskasing district came under industrial development somewhat later than the area of the province tributary to the "Great Lakes." The town of Kapuskasing standing where the trans-

continental line of the Canadian National Railway crosses the Kapuskasing river was the outgrowth of a camp that held alien enemy internees during World War I. The Ontario Government before the end of the war established a veterans' settlement project in the neighbourhood and erected a few buildings on the townsite as a nucleus of a town, which it was expected would attract industry sooner or later. Shortly thereafter the Spruce Falls pulp mill project was started to form the first industry of the district. It was, however, not until 1926, with the organization of the Spruce Falls Power and Paper Co., Ltd., that the forests came under extensive utilization. With the development of major industry in the district the past twenty-five years have seen an influx of settlers and many thriving communities have sprung up. The lumber industry is now well established, utilizing white spruce mainly, which grows to large sizes along rivers and streams and in the upland mixed forests.

## *Areas*

The total area of the Kapuskasing district for the purposes of this report is 10,394,309 acres (table 1), 16,241 square miles, excluding Indian Reserve lands. It is of importance to note that a portion of the area at the north extends beyond the boundary of the Kapuskasing administrative district, as laid down



FIGURE 1

on the maps of Department of Lands and Forests, and a small area lying in the northeastern part of the Kapuskasing district is excluded from this report (fig. 1).

The Kapuskasing district is essentially a timber producing area with 8,061,696 acres or 77 per cent of the total area classified as productive forest land (fig. 2). Non-forested lands, including lands permanently withdrawn from timber production, comprise only 85,789 acres or less than one per cent of the total area. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity occupy 1,880,971 acres, or 18 per cent of the total area. Water covers an area of 365,853 acres or under 4 per cent of the total area.

The non-forested lands include the important developed agricultural lands of the district amounting to 52,460 acres and grass and meadow lands amounting to 9,932 acres. Agricultural development may be expected to expand beyond its present limited boundaries in the district to other areas of fertile clay soils.

TABLE 1. — *Total area classification into broad land and ownership groupings.*

Kind of area	Crown land	Patented land	Total
	<i>acres</i>	<i>acres</i>	<i>acres</i>
Productive forest land <sup>1</sup> .....	7,216,987	844,709	8,061,696
Non-forested land <sup>2</sup>			
Developed agricultural land.....	12,913	39,547	52,460
Grass and meadow land.....	8,724	1,208	9,932
Non-reproducing burn.....	1,748	252	2,000
Unclassified land <sup>3</sup> .....	16,564	4,833	21,397
TOTAL.....	39,949	45,840	85,789
Non-productive forest <sup>4</sup>			
Open muskeg.....	661,270	9,307	670,577
Treed muskeg.....	817,303	71,030	888,333
Brush alder and flooded land.....	240,259	65,654	305,913
Rock outcrop.....	15,323	754	16,077
Barrens.....	37	34	71
TOTAL.....	1,734,192	146,779	1,880,971
Water.....	365,853		365,853
TOTAL AREA.....	9,356,981	1,037,328	10,394,309

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be out of the commercial timber producing class, owing to very low productivity.

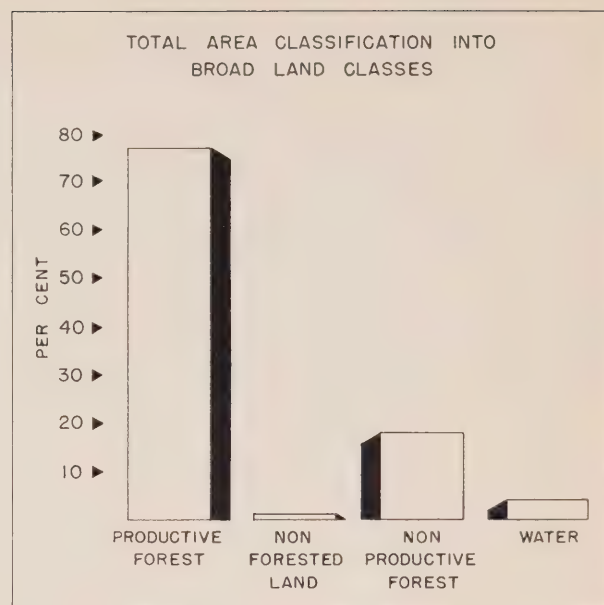


FIGURE 2

### Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement, and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. In the early days of railway construction in the province, land grants were made to some of the railways in lieu of cash subsidies. In the Kapuskasing district, 17 townships comprising an area of some 800,000 acres originally granted to railways are now privately owned. These lands are for the most part managed for timber production, although small areas close to transportation are used for agricultural purposes. The balance of the privately owned lands amounting to somewhat over 200,000 acres, is in small farm holdings concentrated along the railway and the one provincial highway traversing the district over about the same course.

Of the total area of the Kapuskasing district of 10,394,309 acres, 9,356,981 acres are in the ownership of the Crown and 1,037,328 acres patented land (table 1), 90 per cent of the total area is Crown land and 10 per cent is patented. Considering only the productive forest land totalling 8,061,696 acres the relationship of Crown lands to patented lands is only slightly changed.



Developed agricultural lands occupy 39,547 acres or 4 per cent of the total patented land area. An additional area of 12,913 acres of developed agricultural land is in Crown ownership. This is for the most part, located land for which letters patent has not been issued.

### Age Classes

The forests of the Kapuskasing district have been under intensive utilization for less than twenty-five years. Ground conditions, due to the clay soils and low relief are damp; except during rather infrequent, long continued, dry weather and forest fires have been less frequent in this district than in most other parts of the province. The forests, therefore, have been little disturbed and the age class distribution shows a preponderance of the mature age class.

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Mature forest:						
Coniferous.....	3,307,672	46	419,710	49	3,727,382	46
Hardwood .....	110,920	1	15,124	2	126,044	2
Mixedwoods.....	1,060,143	15	192,418	23	1,252,561	15
TOTAL .....	4,478,735	62	627,252	74	5,105,987	63
Immature forest:						
Coniferous.....	885,654	12	46,881	6	932,535	11
Hardwood .....	196,968	3	13,036	1	210,004	3
Mixedwoods.....	467,275	6	17,320	2	484,595	6
TOTAL .....	1,549,897	21	77,237	9	1,627,134	20
Young growth:						
Coniferous .....	243,576	4	9,864	1	253,440	3
Hardwood .....	154,360	2	47,241	6	201,601	3
Mixedwoods .....	304,588	4	37,689	4	342,277	4
TOTAL .....	702,524	10	94,794	11	797,318	10
Reproducing forest	485,831	7	45,426	6	531,257	7
TOTAL PRODUCTIVE FOREST.....	7,216,987	100	844,709	100	8,061,696	100

For the district as a whole, 5,105,987 acres or 63 per cent of the productive forest is in the mature age class, 1,627,134 acres or 20 per cent is immature, 797,318 acres or 10 per cent is young growth and 531,257 acres or 7 per cent is reproducing forest (table 2). The age class distribution shows a surplus of mature timber and a corresponding deficiency in

the area of immature and young growth. The area of reproducing forest is made up almost wholly of recently logged areas (fig. 3).

The age class distribution for Crown lands is very similar to the total productive forest with: 62 per cent mature, 21 per cent immature, 10 per cent young growth and 7 per cent reproducing forest.

The age class distribution for patented lands goes somewhat more to mature timber with: 74 per cent mature, 9 per cent immature, 11 per cent young growth and 6 per cent reproducing forest.

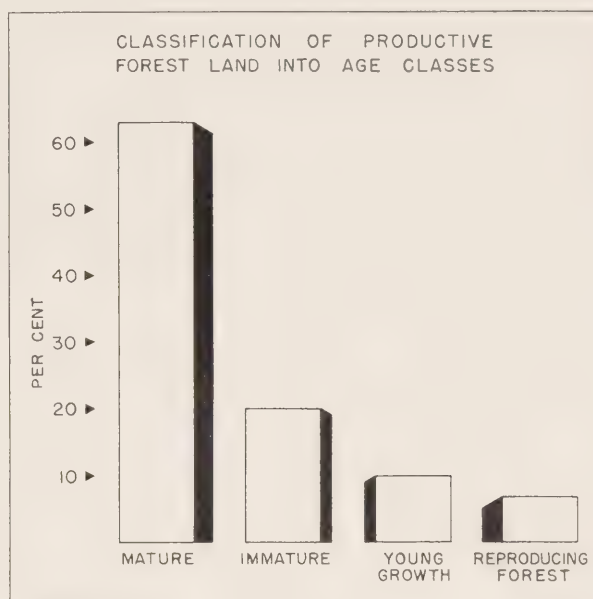


FIGURE 3

### Regional Forest Types

Present conditions relating to the existence and distribution of forests obviously depend upon the succession of physical changes which have taken place during the past. In the case of Ontario the matter is especially important not only due to the large areas affected, but also because the greatest changes took place in the period immediately preceding the present one, involving extremes of temperature and physical modification of the land surface.

Although at least five glacial periods have been recognized, during each of which the ice sheets have covered the entire province, the last or "Wisconsin" ice sheet so modified the land surface that the evidence of previous glaciation is covered up. As the last ice sheet receded, north of the Height of Land in eastern Ontario, a lake, known as Lake Ojibway, was formed as a result of the damming of water by the receding ice sheet on the north and the watershed on the

south. The deep water deposits of this lake are of importance in that they constitute the great Clay Belt region of northern Ontario in which the major portion of the Kapuskasing district lies.

In the Kapuskasing district four forest regions or sections have been recognized based on physiographic differences arising from the sequence of events during the recession of the last ice sheet and closely related to the origin and final draining of Lake Ojibway to the north (fig. 4).

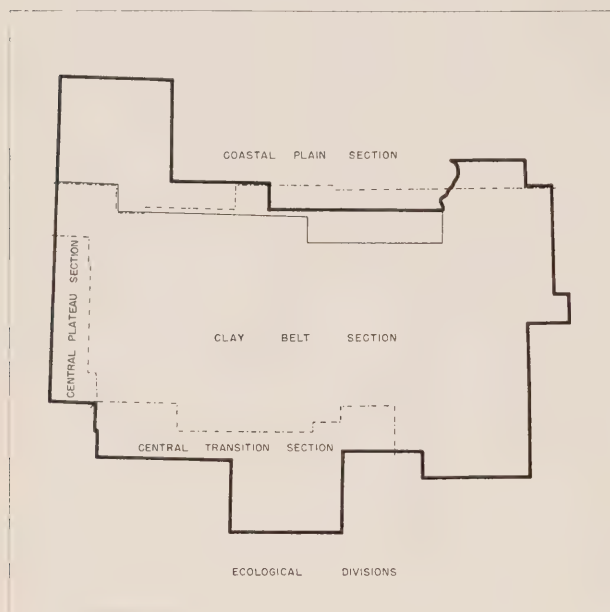


FIGURE 4

1. The Coastal Plain section comprises 10 per cent of the Kapuskasing district.
2. The Clay Belt section covers 73 per cent of the total area of the district.
3. The Central Transition section in the south covers 13 per cent of the total area.
4. The Central Plateau section in the southwest comprises 4 per cent of the total area.

For each section separate volume tables are prepared and they serve as units in the compilation of volume estimates.

The Coastal Plain section covering 10 per cent of the area occupies the north part of the Kapuskasing district. The clay soils are shallow, lying on horizontal strata of limestone rocks of palaeozoic age. Drainage is very poor and extensive bogs and muskegs are interspersed with stands of timber of commercial size on the higher ground. Black spruce is the predominating species of the forest.

The Clay Belt section which occupies almost three-quarters of the total area of the district is made up of the deep water deposits of glacial Lake Ojibway. The soils are fertile clays and support the most highly productive pulpwood forests of the province. Black spruce is the most important species occurring on all productive forest sites in pure stands in the wet lowlands and damp slopes and mixed with white spruce, poplar and white birch on the uplands. Jack pine occurs sporadically on the limited areas of sandy soils.

The Central Transition section occupying 13 per cent of the total area belongs to the typical forests of the Height of Land area of the province. Spruce-fir stands occupy all of the heavier well-drained soils as a mature forest. Jack pine stands, dense and of good development, are found on coarse sand and gravelly soils. The relatively intolerant poplar and white birch are the only important broadleaved tree species.

The Central Plateau section covering only 4 per cent of the total area occupies a small portion in the southwest part of the district. This section is similar as far as forest composition is concerned to the Central Transition section but differs in volume as it is approaching the more westerly part of the province.

### *Cover Types*

The forests of the Kapuskasing district contain only eight commercial species. Six of these make up 98 per cent of the total wood volume: black spruce 44 per cent, white spruce 8 per cent, balsam fir 8 per cent, jack pine 5 per cent; along with the intolerant hardwoods, poplar 26 per cent and white birch 7 per cent.

The forests of the district are described under three broad cover types, coniferous, hardwood, and mixedwoods. The coniferous type is composed of 75 per cent or more conifers or softwood trees, the hardwood type contains 75 per cent or more hardwood or broadleaved trees. All other combinations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts, areas of reproducing forests, too recently established to have attained a sufficiently stable composition to be classified into types on the basis of composition. These areas are referred to as reproducing forest.

For the district as a whole the coniferous type predominates, occupying 61 per cent of the productive

TABLE 3. — *Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
<b>Coniferous type:</b>						
Mature .....	3,307,672	46	419,710	50	3,727,382	46
Immature .....	885,654	12	46,881	6	932,535	12
Young growth .....	243,576	4	9,864	1	253,440	3
TOTAL .....	4,436,902	62	476,455	57	4,913,357	61
<b>Hardwood type:</b>						
Mature .....	110,920	1	15,124	2	126,044	2
Immature .....	196,968	3	13,036	1	210,004	3
Young growth .....	154,360	2	47,241	6	201,601	2
TOTAL .....	462,248	6	75,401	9	537,649	7
<b>Mixedwoods type:</b>						
Mature .....	1,060,143	15	192,418	23	1,252,561	16
Immature .....	467,275	6	17,320	2	484,595	6
Young growth .....	304,588	4	37,689	4	342,277	4
TOTAL .....	1,832,006	25	247,427	29	2,079,433	26
<b>Reproducing forest</b>						
.....	485,831	7	45,426	5	531,257	6
TOTAL PRODUCTIVE FOREST .....	7,216,987	100	844,709	100	8,061,696	100

forest area (table 3). The mixedwoods type occupies 26 per cent and the hardwood type the smallest

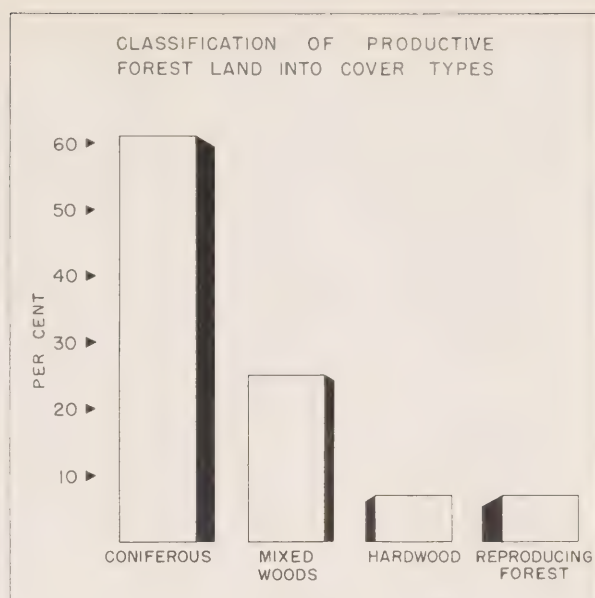


FIGURE 5

area, 7 per cent. Six per cent is classed as reproducing forest (fig. 5).

The distribution of cover types for Crown lands is very similar to the productive forest area with: 62 per cent coniferous, 25 per cent mixedwoods, 6 per cent hardwood, and 7 per cent reproducing forest. Patented lands, which occupy only 10 per cent of the total area show: 57 per cent coniferous, 29 per cent mixedwoods, 9 per cent hardwood, and 5 per cent reproducing forest.



*Preparing black spruce seedlings.*



## Volume

The volume of the primary growing stock includes all living trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees but excludes all limb wood.

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average total
	4''-9'' d.b.h.	10''+ d.b.h.	Average	4''-9'' d.b.h.	10''+ d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1314	752	2066	1623	1300	2923	2172
Immature.....	1139	194	1333	1587	336	1923	1361
Productive forest.....	1060	509	1569	1350	996	2346	1650

The volume of the primary growing stock on productive forest lands in the Kapuskasing district is over 13 billion cubic feet (13,303,837,000 cubic feet).

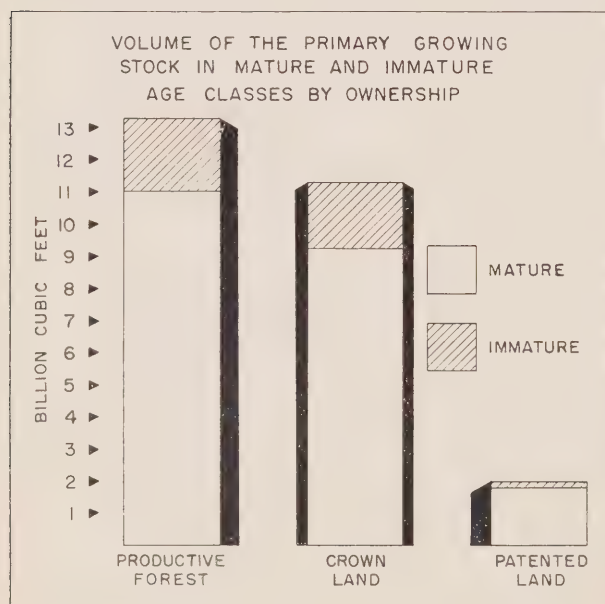


FIGURE 6

This is an average of 1,650 cubic feet per acre (table 4). Most of the volume is in the mature age class with 11 billion cubic feet (table 5) or 2,172 cubic feet per acre, while the immature age class contains over 2 billion cubic feet or 1,361 cubic feet per acre (fig. 6). Of the total volume 83 per cent is in the mature age class and only 17 per cent in the immature class.

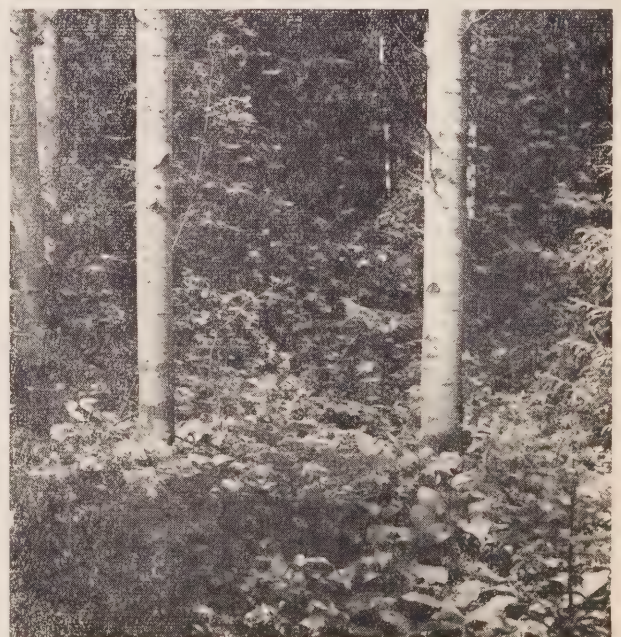
The volume of the primary growing stock on

Crown lands in the Kapuskasing district is 11 billion cubic feet (table 6) or an average of 1,569 cubic feet per acre. The mature age class contains 9 billion cubic feet and the immature age class 2 billion cubic feet (fig. 6).

Patented lands in the Kapuskasing district contain a total of nearly 2 billion cubic feet (table 7) averaging 2,346 cubic feet per acre. The mature age class contains 1.8 billion cubic feet averaging 2,923 cubic feet per acre. There is an inconsiderable area of the immature age class on patented lands with a volume of only 148 million cubic feet (fig. 6). Patented lands in the Kapuskasing district are mainly in the central, highly productive part of the district and contain higher stand per acre than the average for the district as a whole.

## *Conifers vs. Hardwoods*

The commercially valuable conifers or softwood species make up 67 per cent of the primary growing stock in the Kapuskasing district. The balance of 33 per cent is hardwood or broad leaved species almost wholly poplar and white birch. The total volume of conifers on the productive forest area is 9 billion cubic feet and only 4 billion cubic feet are hardwoods (table 8). In the mature age class conifers predominate with nearly 8 billion cubic feet, to a little over 3 billion cubic feet of hardwoods. As is usual throughout the province the intolerant hardwoods, poplar and white birch occupy a more im-



*Scenic beauty in Ontario forests.*

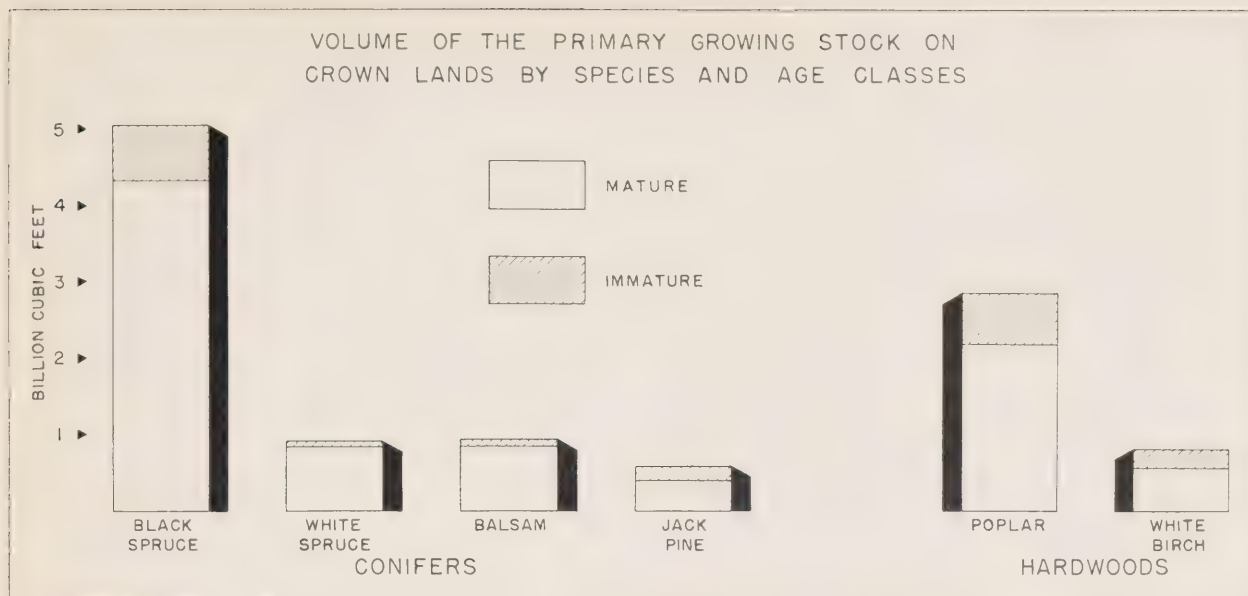


FIGURE 7

portant place in the composition of the immature forest which contains 1.2 billion cubic feet of conifers and one billion cubic feet of hardwoods.

The most important conifer is black spruce which makes up two-thirds of the total cubic volume of conifers on Crown lands (fig. 7). The balance is made up of white spruce and balsam fir each of which has a volume of nearly one billion cubic feet. The only other commercially important conifer is jack pine with a total volume of 600 million cubic feet.

The volume of the primary growing stock for hardwoods on Crown lands is over 3 billion cubic feet the greater part of which is poplar (table 9, fig. 7). The volume of white birch is just under 800 million cubic feet.

The relationship of the volume of conifers to hardwoods is very similar on patented lands and Crown lands (table 10, fig. 8). Black spruce is the most important species in both age classes and poplar is present in much greater volumes than white birch.

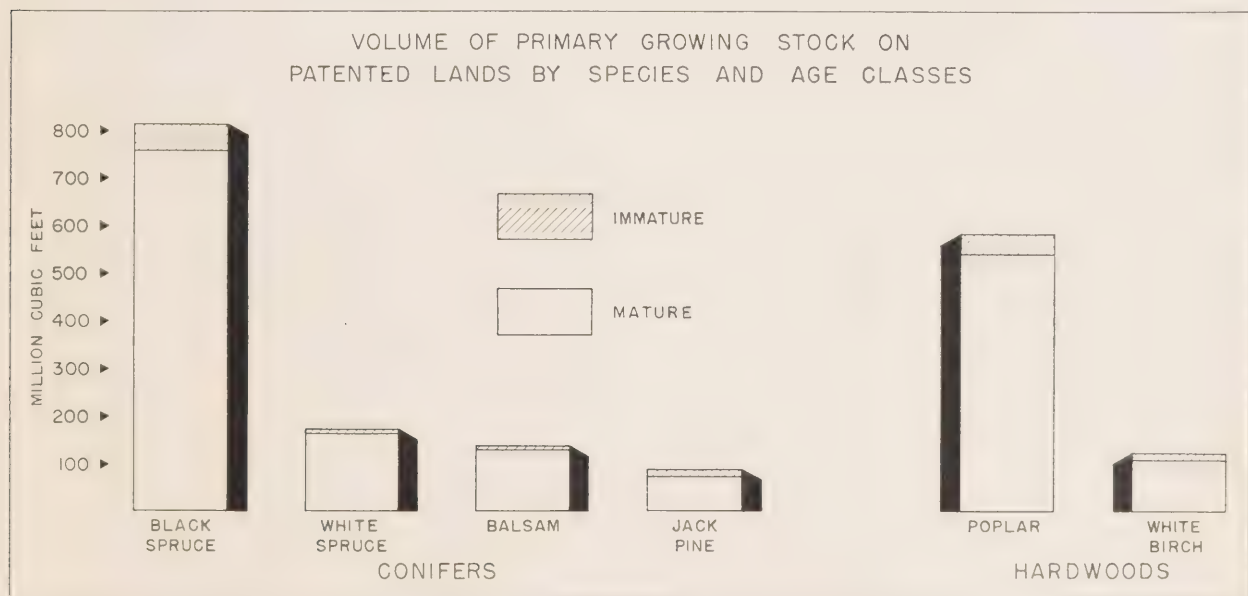


FIGURE 8

### Sawlogs vs. Pulpwood

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as pulpwood and cordwood material depending on species, although poles, railway ties, and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for sawlogs, and other uses where larger timber is required. A tree 10 inches d.b.h. outside bark will on the average produce one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition there is residual smaller size material in the top which may be used as pulpwood or for purposes other than saw timber. The total quantity of wood in the residual top is relatively small and is included in the 10 inch and over material in all inventory estimates. With a ready local market for pulpwood in the Kapuskasing district all of the material in the tops of sawlog size timber can be utilized for pulpwood.

Of the volume of the primary growing stock on productive forest lands 8,792 million cubic feet are in the 4-9 inch d.b.h. size class and 4,512 million cubic feet in the 10 inch d.b.h. class and over (table 8). Sixty-six per cent of the total volume is in the pulpwood size class and 34 per cent of sawlog size. Considering only the mature age class 6,904 million

cubic feet are in the 4-9 inch size class and 4,185 in the 10 inch and over size class. Sixty-two per cent of the volume of the mature age class is in the pulpwood size class and 38 per cent in the sawlog size class (fig. 9).

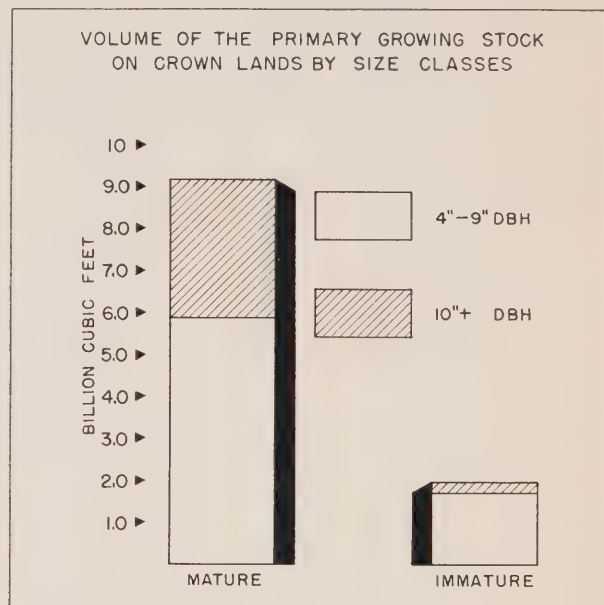


FIGURE 10

For the mature age class on Crown lands of the district 5,886 million cubic feet are in the 4-9 inch size class. Sixty-three per cent is in the pulpwood

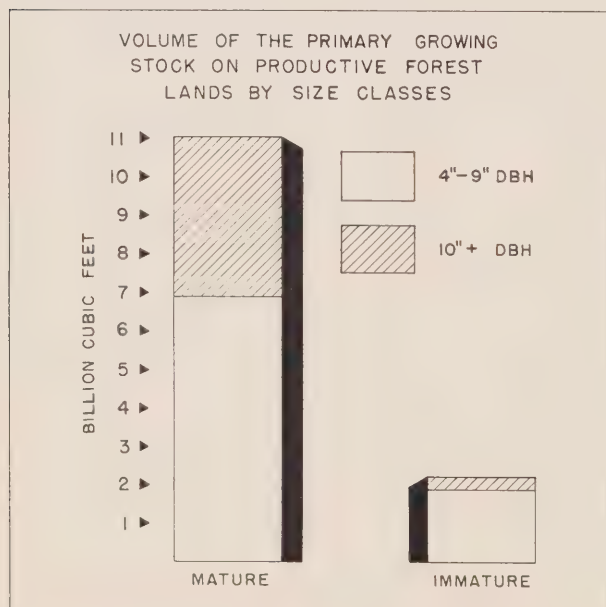


FIGURE 9

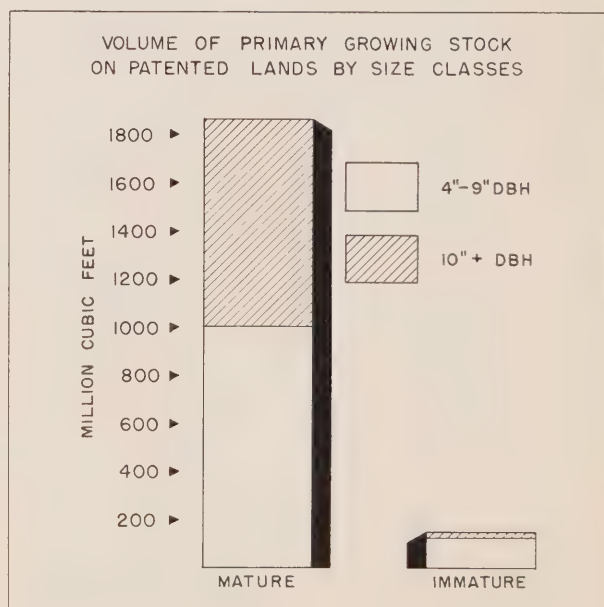


FIGURE 11



size class and 37 per cent in the sawlog size class (table 9, fig. 10). On patented lands in the district the proportion of sawlog material is somewhat higher making up 44 per cent of total volume with 56 per cent in the pulpwood size class (table 10, fig. 11).

The sawlog size class in the mature forest on Crown lands is made up of 1,539 million cubic feet of conifers and 1,830 million cubic feet of hardwoods (table 9). Only about 21 per cent of the conifers are

of sawlog size, while 55 per cent of the hardwoods are in the sawlog class. The sawlog material in the mature age class is made up of about equal volumes of black and white spruce with a much smaller amount of jack pine (fig. 12). As shown in figure 13 very small quantities of sawlog material are available from the immature stands.

The size class relationships of the volume of the primary growing stock of hardwood species is shown in figure 14. The major portion of the hardwood sawlog material comes from poplar in the mature age class.

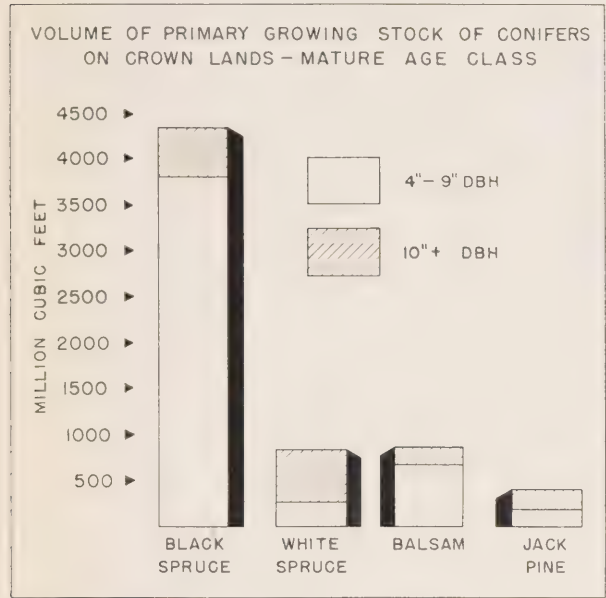


FIGURE 12



Logs released from storage bin being fed into mechanical grinders. Kapuskasing, Ontario.

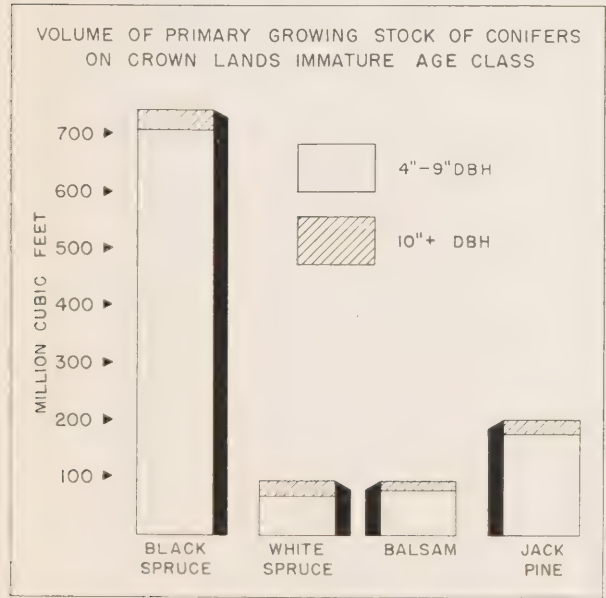


FIGURE 13

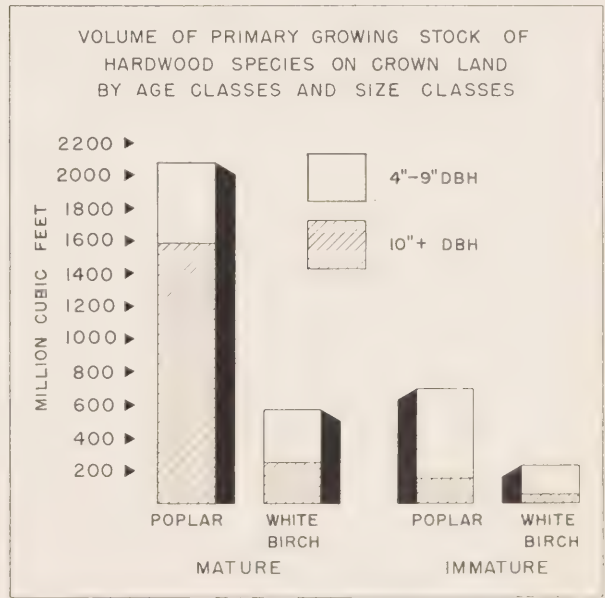


FIGURE 14

TABLE 5.—Cubic-foot volume of primary growing stock on productive forest land (Crown plus patented land) in the Kaposkasing district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	5,161,796	1,711,035	817,397	84,424	7,774,652
Hardwood.....	194,029	228,940	312,449	65,684	801,102
Mixedwoods.....	1,547,753	2,245,029	758,897	176,404	4,728,083
TOTAL...	6,903,578	4,185,004	1,888,743	326,512	13,303,837

TABLE 6.—Cubic-foot volume of primary growing stock on Crown land in the Kaposkasing district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	4,418,434	1,432,037	745,024	71,299	6,666,794
Hardwood.....	175,150	197,912	288,938	60,564	722,564
Mixedwoods.....	1,292,237	1,739,276	732,222	168,716	3,932,451
TOTAL...	5,885,821	3,369,225	1,766,184	300,579	11,321,809

ALL CONIFERS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	4,942,601	1,146,751	744,267	56,158	6,889,777
Hardwood.....	24,845	17,020	19,897	4,251	66,013
Mixedwoods.....	862,072	693,372	355,145	53,355	1,963,944
TOTAL...	5,829,518	1,857,143	1,119,309	113,764	8,919,734

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	4,230,635	970,405	678,689	48,672	5,928,401
Hardwood.....	23,232	15,322	18,700	3,729	60,983
Mixedwoods.....	716,315	553,547	344,028	50,282	1,664,172
TOTAL...	4,970,182	1,539,274	1,041,417	102,683	7,653,556

ALL HARDWOODS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	219,195	564,284	73,130	28,266	884,875
Hardwood.....	169,184	211,920	292,552	61,433	735,089
Mixedwoods.....	685,681	1,551,657	403,752	123,049	2,764,139
TOTAL...	1,074,060	2,327,861	769,434	212,748	4,384,103

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	187,799	461,632	66,335	22,627	738,393
Hardwood.....	151,918	182,590	270,238	56,835	661,581
Mixedwoods.....	575,922	1,185,729	388,194	118,434	2,268,279
TOTAL...	915,639	1,829,951	724,767	197,896	3,668,253

TABLE 7. — *Cubic-foot volumes of primary growing stock on patented land in the Kapuskasing district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4'' 9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	743.362	278.998	72.373	13.125	1,107.858
Hardwood.....	18.879	31.028	23.511	5.120	78.538
Mixedwoods...	255.516	505.753	26.675	7.688	795.632
TOTAL...	1,017.757	815.779	122.559	25.933	1,982.028

ALL CONIFERS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4'' 9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	711.966	176.346	65.578	7.486	961.376
Hardwood.....	1.613	1.698	1.197	522	5,030
Mixedwoods...	145.757	139.825	11.117	3.073	299.772
TOTAL...	859.336	317.869	77.892	11.081	1,266.178

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous....	31.396	102.652	6.795	5.639	146.482
Hardwood....	17.266	29.330	22.314	4.598	73.508
Mixedwoods...	109.759	365.928	15.558	4.615	495.860
TOTAL...	158.421	497.910	44.667	14.852	715.850

TABLE 8. — *Cubic-foot volume of primary growing stock on productive forest land in the Kapuskasing district by species and age class in two size classes.*

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	410	18,666	24	195	19,295
Red pine.....	333	4,880	.....	.....	5,213
Jack pine.....	225,180	252,672	189,178	25,328	692,358
White spruce...	314,229	681,984	72,612	29,739	1,098,564
Black spruce...	4,475,846	620,652	759,854	37,702	5,894,054
Balsam fir.....	754,667	224,620	85,740	16,210	1,081,237
White cedar.....	45,014	50,491	4,728	4,259	104,492
Larch.....	13,839	3,178	7,173	331	24,521
TOTAL CONIFERS	5,829,518	1,857,143	1,119,309	113,764	8,919,734
White birch.....	386,926	297,187	190,753	52,458	927,324
Poplar.....	686,898	2,029,375	578,681	160,290	3,455,244
Other hardwoods	236	1,299	.....	.....	1,535
TOTAL HARDWOODS	1,074,060	2,327,861	769,434	212,748	4,384,103
TOTAL ALL SPECIES	6,903,578	4,185,004	1,888,743	326,512	13,303,837

TABLE 9. — *Cubic-foot volume of primary growing stock on Crown land in the Kapuskasing district by species and age class in two size classes.*

Species	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4'' 9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	226	9,883	18	147	10,274
Red pine.....	188	2,716	.....	.....	2,904
Jack pine.....	192,821	208,742	177,734	22,519	601,816
White spruce...	261,113	567,884	68,485	26,439	923,921
Black spruce...	3,818,241	517,863	707,367	34,854	5,078,325
Balsam fir.....	655,362	192,811	78,624	14,778	941,575
White cedar.....	32,814	37,275	3,948	3,702	77,739
Larch.....	9,417	2,100	5,241	244	17,002
TOTAL CONIFERS	4,970,182	1,539,274	1,041,417	102,683	7,653,556
White birch.....	322,904	248,995	178,763	48,393	799,055
Poplar (all)....	592,611	1,580,267	546,004	149,503	2,868,385
Other hardwoods	124	689	.....	.....	813
TOTAL HARDWOODS	915,639	1,829,951	724,767	197,896	3,668,253
TOTAL ALL SPECIES	5,885,821	3,369,225	1,766,184	300,579	11,321,809



TABLE 10. — *Cubic-foot volume of primary growing stock on patented land Kapuskasing district by species and age class in two size classes.*

Species	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	184	8,783	6	48	9,021
Red pine.....	145	2,164	.....	.....	2,309
Jack pine.....	32,359	43,930	11,444	2,809	90,542
White spruce.....	53,116	114,100	4,127	3,300	174,643
Black spruce.....	657,605	102,789	52,487	2,848	815,729
Balsam fir.....	99,305	31,809	7,116	1,432	139,662
White cedar.....	12,200	13,216	780	557	26,753
Larch.....	4,422	1,078	1,932	87	7,519
TOTAL CONIFERS.....	859,336	317,869	77,892	11,081	1,266,178
White birch.....	64,022	48,192	11,990	4,065	128,269
Poplar (all).....	94,287	449,108	32,677	10,787	586,859
Other hardwoods	112	610	.....	.....	722
TOTAL HARDWOODS.....	158,421	497,910	44,667	14,852	715,850
TOTAL ALL SPECIES	1,017,757	815,779	122,559	25,933	1,982,028

### Allowable Cut

The allowable cut has been computed for each species with the aid of a volumetric formula<sup>1</sup> and appropriate rotation<sup>2</sup> for species. Thus the amount of the allowable cut results from the volume of the primary growing stock and rotation adopted for each species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may appear on areas which, at the moment, are inaccessible to operations or which are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential rather than actually available under present operating conditions.

The calculation of the allowable cut, based on the present volume of the primary growing stock, is of value for a period of about ten years. This is because of woods operations being carried out and the present stands growing in volume, each year. Therefore, the size and structure of the primary growing stock,

regarded as the foundation of the allowable cut calculations, change also from year to year and for that reason, on expiration of the initial ten year period, the allowable cut should be calculated anew. With effective forestry practices allowable cuts for the more valuable species will tend to remain at the present level, or even to increase; without them the present trend to more and more poplar and white birch at the expense of especially the spruces, may continue.

Patented lands in the district are to a great extent held by the companies and it is expected that timber on these lands will be managed in the same way as on Crown land. Therefore, no distinction of rotations for either Crown or patented lands has been made.

The annual allowable cut, or net depletion allowable under management in the Kapuskasing district is 208,407,655 cubic feet; 177,542,325 cubic feet from Crown lands and 30,865,330 cubic feet from patented lands. Of the total allowable cut 85 per cent is on Crown land and 15 per cent on patented lands.

### CROWN LAND

The annual allowable cut for Crown land represents 1.57 per cent of primary growing stock or 24.6 cubic feet per annum per acre of the productive forest area. Of the total allowable cut, 91,287,285 cubic feet or 51 per cent is coniferous species and 86,255,040 cubic feet or 49 per cent is of hardwood species. Since the rotation age is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.2 per cent of the coniferous primary growing stock and 2.4 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 72 per cent is white and black spruce, 15 per cent balsam, 12 per cent jack pine, and one per cent other conifers. The relationship of the allowable cut for a

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Kapuskasing district.*

Species	Annual allowable cut cu. ft.
White pine.....	109,630
Red pine.....	37,190
Jack pine.....	11,008,800
White spruce.....	11,830,645
Black spruce.....	54,189,255
Balsam fir.....	13,396,345
White cedar.....	497,720
Larch.....	217,700
TOTAL CONIFERS.....	91,287,285

<sup>1</sup> Methods of calculation of allowable cut are given in Appendix; methods, allowable cut, page 24.

<sup>2</sup> Rotation by species, table 16, page 24.

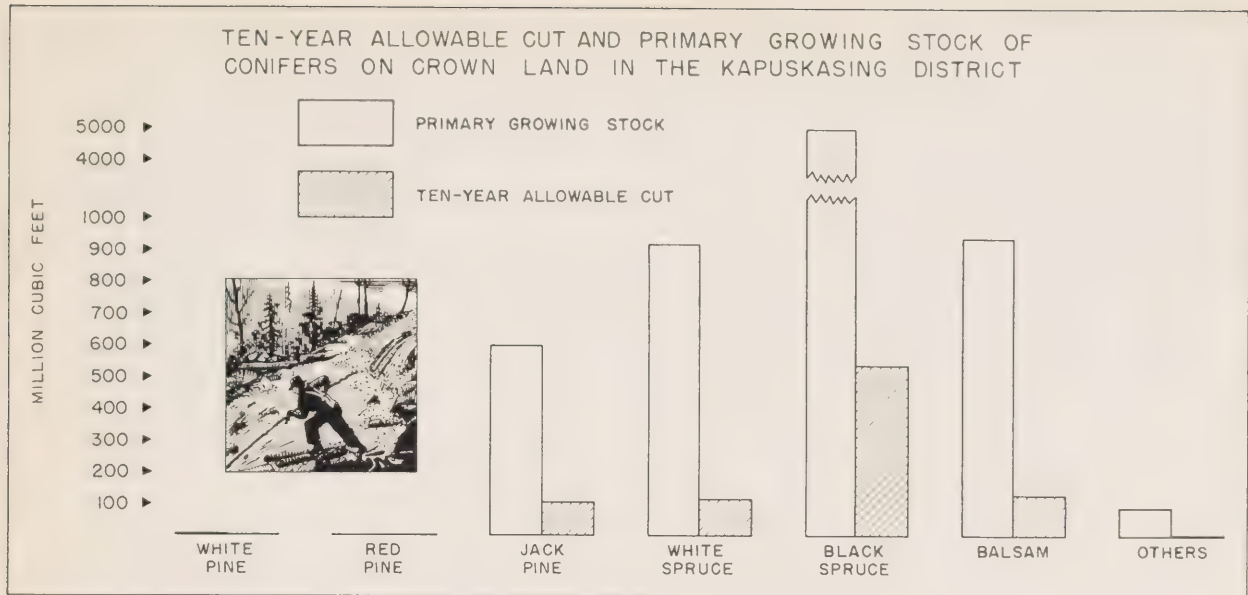


FIGURE 15

ten year period to the volume of the primary growing stock by species is shown graphically, figure 15.

The species making up the hardwood content (table 12) shows that over 85 per cent is poplar and almost 15 per cent is white birch, whereas other hardwoods appear in inappreciable quantities. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 16.

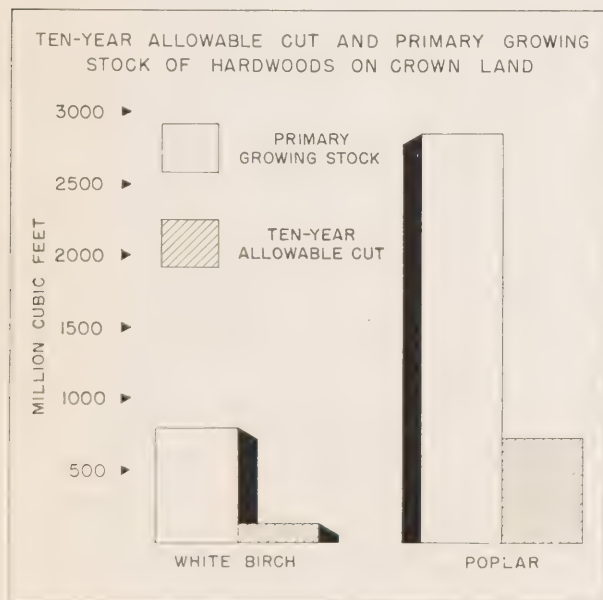


FIGURE 16

TABLE 12. — *Annual allowable cut for hardwood species on Crown land.*

Species	Annual allowable cut cu. ft.
White birch.....	12,789,695
Poplar (all).....	73,458,425
Other hardwoods.....	6,920
<b>TOTAL HARDWOODS.....</b>	<b>86,255,040</b>

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 30,865,330 cubic feet, which represents 1.6 per cent of the primary growing stock or 36.5 cubic feet per annum per acre of the productive forest land. The annual allowable cut on patented lands is 1.1 per cent of the coniferous primary growing stock and 2.3 per cent for the hardwoods.

TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut cu. ft.
White pine.....	92,655
Red pine.....	28,460
Jack pine.....	1,594,250
White spruce.....	2,152,545
Black spruce.....	8,378,510
Balsam fir.....	1,912,665
White cedar .....	164,870
Larch.....	92,680
<b>TOTAL CONIFERS .....</b>	<b>14,416,635</b>
White birch .....	1,976,215
Poplar (all).....	14,466,585
Other hardwoods.....	5,895
<b>TOTAL HARDWOODS .....</b>	<b>16,448,695</b>

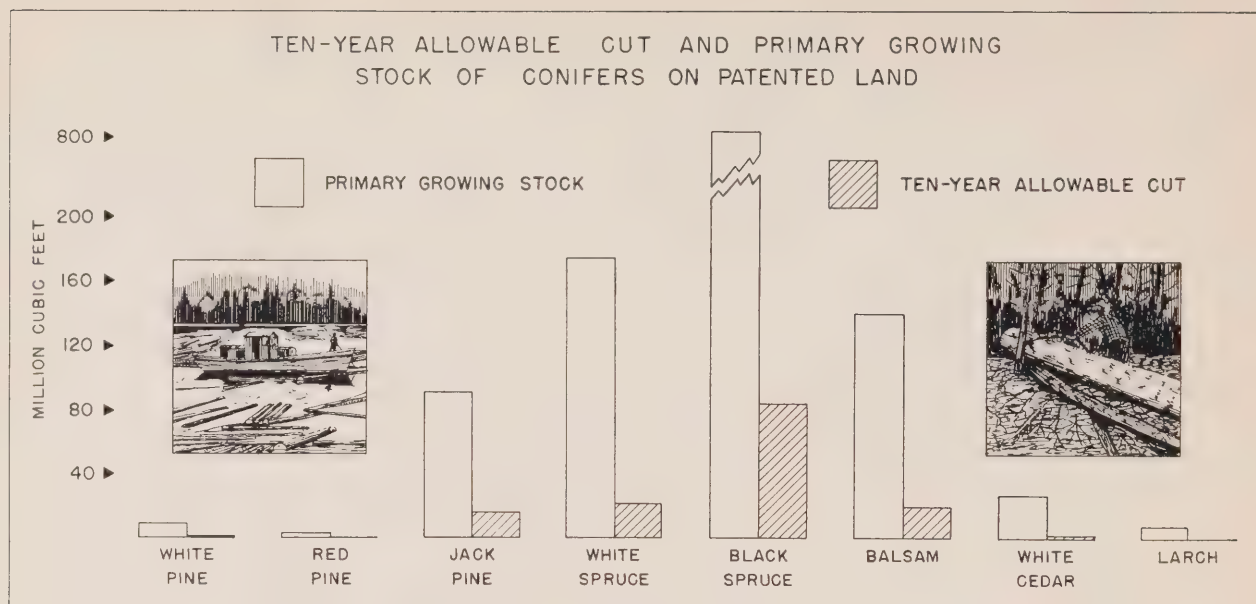


FIGURE 17

The annual allowable cut for coniferous species on patented lands is 14,416,635 cubic feet and for hardwoods, 16,448,695 cubic feet. Over one-half of the allowable cut is for the two intolerant hardwood species, poplar and white birch which together contribute 16,442,800 cubic feet to the total allowable cut. For the coniferous species black and white spruce contribute over 10 million cubic feet; balsam is next in importance with almost two million cubic feet, followed by jack pine. White cedar, white pine,

larch and red pine are present in inappreciable amounts (figs. 17 and 18).

#### *Utilization vs. Allowable Cut*

According to the Classification of Annual Timber Returns<sup>1</sup> for the period 1946-1949 inclusive, the average annual amounts of wood and forest products were cut on Crown lands in the Kapuskasing district as follows:

Pulpwood.....	484,480 cords
Fuelwood.....	6,648 cords
Logs and booms.....	11,789,777 F.B.M. Doyle rule
Piling.....	145,977 pieces
Posts.....	1,247 pieces
Poles.....	648 pieces
Ties.....	418 pieces

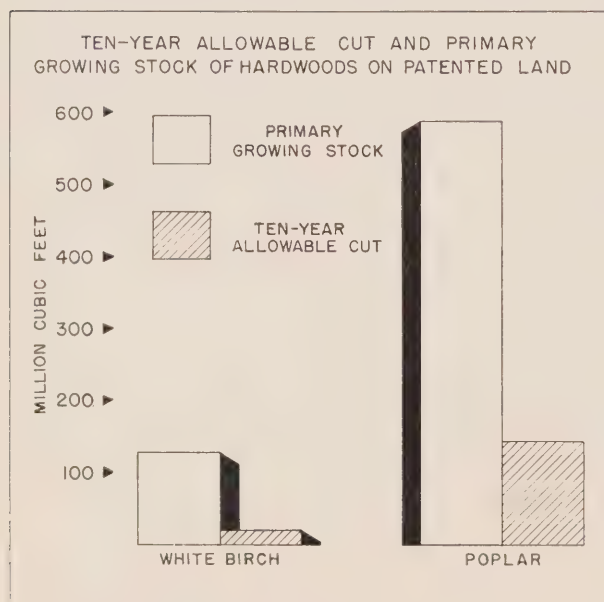


FIGURE 18

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet and are comparable with the figures for allowable cut (table 14).

A comparison of the annual allowable cut with the actual cut by species (table 15) indicates that only the utilization of spruce was close to the allowable cut, and that utilization of other species was considerably less than the allowable cut permits (fig. 19).

The hardwood species were scarcely utilized in the Kapuskasing district with only 2,081 thousand cubic feet used out of a total allowable cut of 86,255

<sup>1</sup> Report of the Minister of Lands and Forests, for the Province of Ontario for the fiscal years ending March 31, 1947-1950.



TABLE 14. - Gross total cubic volume of wood utilized annually in the Kapuskasing district.

Species	Wood utilized cu. ft.	Total per cent
Jack pine .....	1,422,844	2
Spruce, white and black .....	53,338,851	87
Balsam fir.....	5,020,192	8
White cedar .....	9,736	
Larch .....	693	
TOTAL CONIFERS.....	59,792,316	97
White birch .....	565,120	1
Poplar .....	1,515,418	2
TOTAL HARDWOODS.....	2,080,538	3
TOTAL	61,872,854	

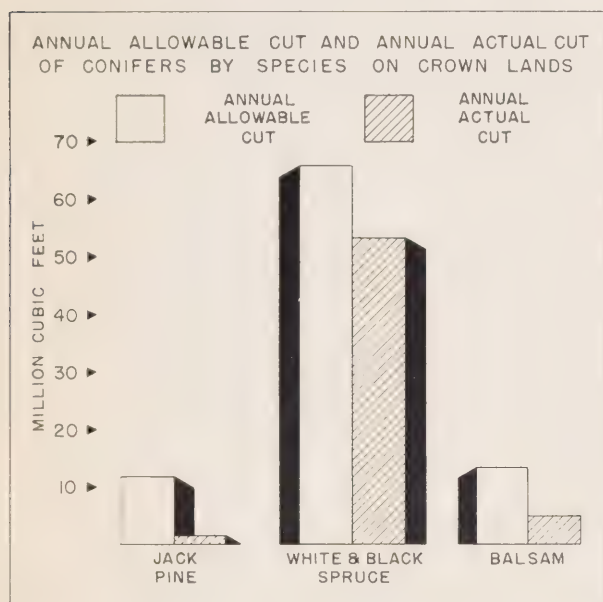


FIGURE 19

TABLE 15. — Comparison of allowable cut with actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red	147	
Jack pine	11,009	1,423
Spruce	66,920	53,339
Balsam fir	13,396	5,020
White cedar	498	10
Larch	217	
TOTAL CONIFERS	91,287	59,792
White birch	12,750	565
Poplar	73,458	1,516
TOTAL HARDWOODS	86,255	2,081
TOTAL	177,542	61,873

thousand cubic feet (table 15). While the cut of conifers was 65 per cent of their allowable cut, only two per cent of the allowable cut for hardwood species was utilized. Excessive volumes of poplar and white birch remain unutilized on Crown land in the Kapuskasing district (fig. 20).

There are no available records of the quantity of timber utilized from patented lands in the Kapuskasing district.

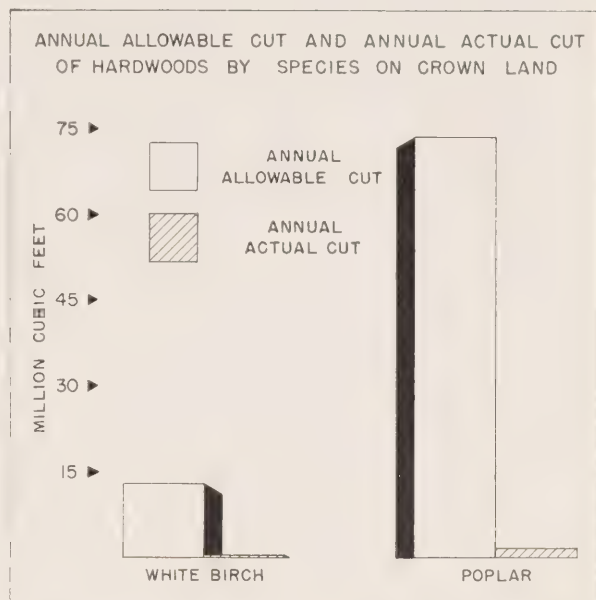


FIGURE 20



Pulp logs are floated from boom into jack ladder at mill in Kapuskasing, Ont.

# APPENDIX

## Survey Methods

The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were made by direct photographic interpretation on stereoscopic pairs of photographs and transferred to the base maps.

Systematic sampling was carried out by field crews who collected all of the data necessary for making the volume estimates. On the completion of the field work, finished forest type maps were prepared and areas determined by the usual methods<sup>1</sup>.

Volume estimates were prepared for type aggregates. For this purpose, types were classified into three cover types: coniferous, hardwood, and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for three of the four regions or ecological sections in the Kapuskasing district. The Coastal Plain section was summarized with the Clay Belt section. The per acre volumes in cubic feet, made up in this manner are shown in tables 18, 19, 20, 21.

The holder of a licence to cut Crown timber in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory for the Kapuskasing district is, therefore, made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Kapuskasing district are shown in figure 21.

## Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class Ib<sup>2</sup>

<sup>1</sup> A complete statement of the methods used in the inventory will be found in Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

<sup>2</sup> Manual of Timber Management, Dept. of Lands and Forests, Ontario—Part II, page 50.

were used as rotation ages for all species encountered, with the exception of jack pine, for which a rotation of seventy years, instead of sixty, has been adopted (table 16).

In calculation of allowable cut the same rotation ages for Crown as for patented lands were used.

TABLE 16. — *Rotation ages by species.*

Species	Crown and patented lands Years
White pine.....	120
Red pine.....	100
Jack pine.....	70
White spruce.....	100
Black spruce.....	120
Balsam fir.....	90
White cedar.....	200
Larch.....	100
Yellow birch.....	150
White birch.....	80
Poplar (all).....	50
Red maple.....	70

## Allowable Cut

### (a) METHOD

The following two bases were available for calculation of allowable cut: 1. the volumes of the mature and immature age classes for each species, and 2. the adopted rotation ages.

The compilation was carried out in such a way that the volumes were shown by species. This sug-

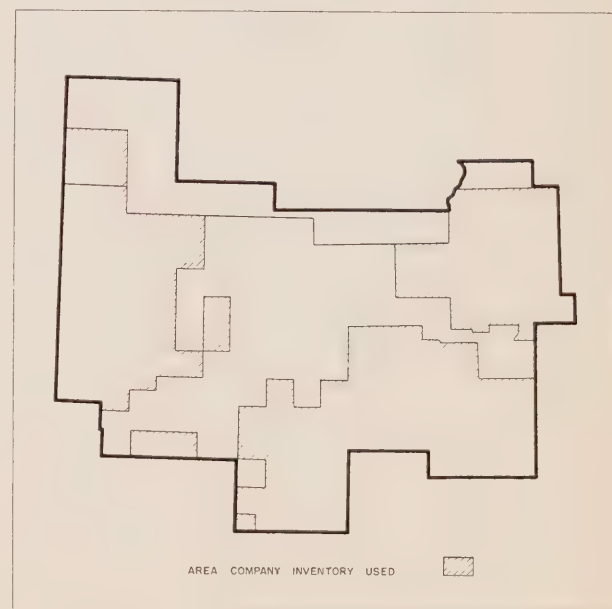


FIGURE 21

gests the calculation of allowable cut by individual species, separately, rather than for the total primary stock in the district, and the method of calculating most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory, for the following reasons: 1. The ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 required by the French method. 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. 3. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

(b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n \cdot 3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I)
- V.2. — denotes volume of immature timber (Age Class II)
- n — denotes rotation
- P — denotes annual allowable cut

By application of this formula the following figures for the annual allowable cut were obtained:

Crown land	259,973,560 cu. ft.
Patented land	46,953,715 cu. ft.
TOTAL .....	306,927,275 cu. ft.

This may be regarded as the maximum annual allowable cut for the district, fully justified if need of intensive utilization was substantiated by the present operations in the district. As, may be seen from table 14, the actually utilized annual volume was only 61,872,854 cu. ft. on Crown land, or 24 per cent of 259,973,560 cu. ft. of the maximum annual allowable cut on Crown land in the Kapuskasing district.

With rather a moderate yet steady demand on wood in view, and with considerable accumulation of mature timber in the district, an advantageous opportunity arises, where by means of a normal, and not the maximum, utilization the normal size

of age classes may be obtained; thus a sound foundation would be created for a balanced sustained yield in the future.

During the period of a gradual, and not radical, normalization of age class areas a portion of mature and overmature stands will be held over and above their mature age. This involves certain losses on volume of those stands where increasing cull may not be balanced by volume increment of ageing stands. These losses, however, are not expected to be of importance inasmuch as the bulk of stands is made of spruce not readily given to decay.

In view of the foregoing, the calculations of the annual allowable cut, carried out on the French method principles, were brought to the normal level, according to the following procedure:

CROWN LAND

Productive forest area — 7,216,987 acres  
Age Class I volume per acre — 2,066.44 cubic feet  
Mean annual increment to the rotation age — 24.73 cubic feet  
Thus the average rotation =  $\frac{2,066.44}{24.73}$  = 84 years  
Normal area allotment =  $\frac{7,216,987}{84}$  = 85,917 acres  
Annual allowable cut = 85,917 x 2,066.44 = 177,542,325 cubic feet

PATENTED LAND

Productive forest area — 844,709 acres.  
Age Class I volume per acre — 2,923.13 cubic feet.  
Mean annual increment to the rotation age — 36.84 cubic feet.  
Thus the average rotation =  $\frac{2,923.13}{36.84}$  = 80 years.  
Normal area allotment =  $\frac{844,709}{80}$  = 10,559 acres.  
Annual allowable cut = 10,559 x 2,923.13 = 30,865,330 cubic feet.

Cull Factor

Where it was found necessary either to calculate net merchantable volumes or to calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, the appropriate cull factors (table 17) were used throughout. These cull factors were taken from the figures for defect made available from operations being carried out in the district.

TABLE 17. — Cull factors by species, Kapuskasing district.

Species	Cull Per cent
Jack pine.....	17.5
Spruce, white and black	12.5
Balsam fir	12.5
Larch	12.5
Cedar	22.5
White birch	25.0
Poplar	12.5

<sup>1</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.



TABLE 18. — *Volume of the primary growing stock in cubic feet per acre*  
*Clay Belt Section — 1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	27.1 3.3	25.9 3.2	22.8 2.8	.....	345.6 14.4	334.4 13.9	289.9 12.1	207.2 8.6
White spruce.....	4"-9" 10" up	26.8 107.3	25.7 103.0	22.6 90.6	.....	55.8 38.8	54.0 37.6	46.8 32.6	.....
Black spruce.....	4"-9" 10" up	1563.2 154.6	1500.2 148.4	1319.1 130.5	626.0 93.5	828.4 43.6	801.4 42.2	695.2 36.6	224.9 11.8
Balsam fir.....	4"-9" 10" up	280.6 53.4	269.2 51.3	236.7 45.1	186.2	202.8 8.4	196.2 8.2	170.2 7.1	59.0 2.5
White cedar.....	4"-9" 10" up	15.0 12.8	14.4 12.3	12.7 10.8	126.2 244.9	26.5 12.4	25.6 12.0	22.2 10.4	83.2 39.1
Larch.....	4"-9" 10" up	6.7 0.9	6.4 0.9	5.6 0.8	.....	22.0	21.3	18.4	..
TOTAL CONIFERS.....	4"-9" 10" up	1919.4 332.3	1841.8 319.1	1619.5 280.6	938.4 338.4	1481.1 117.6	1432.9 113.9	1242.7 98.8	574.3 62.0
White birch.....	4"-9" 10" up	10.9 72.6	10.4 69.7	9.2 61.3	.....	40.6 10.1	39.2 9.8	34.0 8.5	.....
Poplar (all).....	4"-9" 10" up	19.5 175.3	18.7 168.3	16.4 148.0	53.2	15.0 25.6	14.5 24.7	12.6 21.4	6.5 11.2
TOTAL HARDWOODS.....	4"-9" 10" up	30.4 247.9	29.1 238.0	25.6 209.3	53.2	55.6 35.7	53.7 34.5	46.6 29.9	6.5 11.2
GRAND TOTAL.....	4"-9" 10" up	1949.8 580.2	1870.9 557.1	1645.1 489.9	991.6 338.4	1536.7 153.3	1486.6 148.4	1289.3 128.7	580.8 73.2
TOTAL 4" UP.....		2530.0	2428.0	2135.0	1330.0	1690.0	1635.0	1418.0	654.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	.....	.....	.....	.....	6.0	5.8	5.2	2.7
White spruce.....	4"-9" 10" up	77.5 180.9	75.6 176.3	68.8 160.4	39.5 92.3	4.5	4.4	3.9	2.0
Black spruce.....	4"-9" 10" up	108.2 27.1	105.6 26.4	96.1 24.0	55.2 13.8	15.1 2.9	14.7 2.8	13.0 2.5	6.7 1.3
Balsam fir.....	4"-9" 10" up	172.3 57.4	167.9 56.0	152.8 50.9	87.9 29.3	26.8 1.7	26.0 1.7	23.1 1.5	11.9 0.8
White cedar.....	4"-9" 10" up	3.0 1.1	2.9 1.1	2.6 1.0	1.5 0.6	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9" 10" up	361.0 266.5	352.0 259.8	320.3 236.3	184.1 136.0	52.4 4.6	50.9 4.5	45.2 4.0	23.3 2.1
White birch.....	4"-9" 10" up	291.2 291.1	284.0 283.9	258.3 258.3	148.6 148.5	103.5 9.0	100.6 8.8	89.3 7.8	46.0 4.0
Poplar (all).....	4"-9" 10" up	491.5 2399.7	479.3 2340.0	436.0 2128.8	250.7 1224.1	1237.4 93.1	1203.6 90.6	1068.3 80.4	550.2 41.4
TOTAL HARDWOODS.....	4"-9" 10" up	782.7 2690.8	763.3 2623.9	694.3 2387.1	399.3 1372.6	1340.9 102.1	1304.2 99.4	1157.6 88.2	596.2 45.4
GRAND TOTAL.....	4"-9" 10" up	1143.7 2957.3	1115.3 2883.7	1014.6 2623.4	583.4 1508.6	1393.3 106.7	1355.1 103.9	1202.8 92.2	619.5 47.5
TOTAL 4" UP.....		4101.0	3999.0	3638.0	2092.0	1500.0	1459.0	1295.0	667.0

TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine	4"-9" 10" up					325.9 10.1	304.4 9.4	256.7 7.9	
White spruce	4"-9" 10" up	128.2 238.1	126.8 235.5	113.5 216.8		60.0	56.0	47.3	
Black spruce	4"-9" 10" up	388.9 85.4	384.7 84.5	344.4 75.6	224.9	222.7 9.3	208.0 8.7	175.4 7.3	266.5
Balsam poplar	4"-9" 10" up	323.9 138.8	320.4 137.3	286.8 122.9	104.7	165.6 64.4	154.7 60.1	130.4 50.7	156.0 60.7
White cedar	4"-9" 10" up	5.9 5.7	5.8 5.6	5.2 5.0					
TOTAL CONIFERS	4"-9" 10" up	846.9 468.0	837.7 462.9	749.9 414.3	329.6	774.2 83.8	723.1 78.2	609.8 65.9	122.5 60.7
White birch	4"-9" 10" up	263.6 349.5	260.8 345.6	233.4 309.4		192.6 21.4	179.9 20.0	151.7 16.8	144.4 109.0
Poplar (all)	4"-9" 10" up	404.9 1523.1	400.5 1506.5	358.5 1348.5	515.0 1094.4	835.2 92.8	780.1 86.7	657.7 73.1	90.4 115.0
TOTAL HARDWOODS	4"-9" 10" up	668.5 1872.6	661.3 1852.1	591.9 1657.9	515.0 1094.4	1027.8 114.2	960.0 106.7	809.4 89.9	134.8 234.0
GRAND TOTAL	4"-9" 10" up	1515.4 2340.6	1499.0 2315.0	1341.8 2072.2	844.6 1094.4	1802.0 198.0	1683.1 184.9	1419.2 155.8	657.3 284.7
TOTAL 4" UP		3856.0	3814.0	3414.0	1939.0	2000.0	1868.0	1575.0	942.0



Slotted Template laydown.

Photographic Survey Corp., Ltd.

TABLE 19. — *Volume of the primary growing stock in cubic feet per acre*  
*Clay Belt Section — 1949*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	35.3	34.9	33.5	28.1	94.2	91.8	83.6	.....
	10'' up	31.8	31.4	30.2	20.1	23.5	22.9	20.9	.....
White spruce.....	4''-9''	45.6	45.0	43.3	27.6	52.5	51.2	46.6	4.8
	10'' up	93.7	92.7	89.0	98.0	54.5	53.0	48.4	122.5
Black spruce.....	4''-9''	1590.6	1572.1	1510.5	653.6	1350.5	1315.8	1199.1	.....
	10'' up	223.1	220.5	211.9	79.1	72.6	70.7	64.4	.....
Balsam fir.....	4''-9''	134.5	133.0	127.7	150.5	112.2	109.3	99.6	284.1
	10'' up	35.8	35.3	34.0	21.5	11.9	11.6	10.6	150.3
White cedar.....	4''-9''	20.9	20.6	19.8	21.2	13.2	12.9	11.7	.....
	10'' up	17.8	17.6	17.0	33.8	6.1	5.9	5.4	.....
Larch.....	4''-9''	9.9	9.8	9.4	61.9	43.7	42.5	38.7	.....
	10'' up	3.0	3.0	2.8	.....	1.3	1.3	1.2	.....
TOTAL CONIFERS.....	4''-9''	1836.8	1815.4	1744.2	942.9	1666.3	1623.5	1479.3	288.9
	10'' up	405.2	400.5	384.9	252.5	169.9	165.4	150.9	272.8
White birch.....	4''-9''	25.2	24.9	23.9	13.6	33.9	33.0	30.1	14.2
	10'' up	18.7	18.5	17.7	41.4	21.7	21.2	19.3	390.3
Poplar (all).....	4''-9''	53.5	52.9	50.8	44.6	149.7	145.9	132.9	64.3
	10'' up	240.6	237.8	228.5	425.0	98.5	96.0	87.5	39.5
TOTAL HARDWOODS.....	4''-9''	78.7	77.8	74.7	58.2	183.6	178.9	163.0	78.5
	10'' up	259.3	256.3	246.2	466.4	120.2	117.2	106.8	429.8
GRAND TOTAL.....	4''-9''	1915.5	1893.2	1818.9	1001.1	1849.9	1802.4	1642.3	367.4
	10'' up	664.5	656.8	631.1	718.9	290.1	282.6	257.7	702.6
TOTAL 4'' UP.....		2580.0	2550.0	2450.0	1720.0	2140.0	2085.0	1900.0	1070.0

		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	2.6	2.6	2.6	.....	2.3	2.3	2.3	1.6
	10'' up	8.6	8.5	8.4	.....	.....	.....	.....	.....
White spruce.....	4''-9''	71.1	70.7	70.3	35.4	24.4	24.4	24.0	17.1
	10'' up	129.8	129.1	128.2	.....	12.8	12.8	12.6	9.0
Black spruce.....	4''-9''	.....	.....	.....	43.6	32.6	32.6	32.1	22.9
	10'' up	22.3	22.2	22.0	.....	4.6	4.6	4.5	3.2
Balsam fir.....	4''-9''	32.5	32.3	32.1	29.3	26.8	26.8	26.4	18.8
	10'' up	15.8	15.8	15.7	14.3	5.8	5.8	5.7	4.0
Larch.....	4''-9''	.....	.....	.....	.....	4.7	4.7	4.6	3.3
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	106.2	105.6	105.0	108.3	90.8	90.8	89.4	63.7
	10'' up	176.5	175.6	174.3	14.3	23.2	23.2	22.8	16.2
White birch.....	4''-9''	557.4	554.4	550.6	196.8	410.2	410.0	403.5	287.2
	10'' up	142.0	141.2	140.3	255.6	55.4	55.4	54.5	38.8
Poplar (all).....	4''-9''	950.1	945.0	938.6	412.8	1452.9	1452.3	1429.2	1017.2
	10'' up	1787.8	1778.2	1766.2	1737.2	295.5	295.3	290.6	206.9
TOTAL HARDWOODS.....	4''-9''	1507.5	1499.4	1489.2	609.6	1863.1	1862.3	1832.7	1304.4
	10'' up	1929.8	1919.4	1906.5	2092.8	350.9	350.7	345.1	245.7
GRAND TOTAL.....	4''-9''	1613.7	1605.0	1594.2	717.9	1953.9	1953.1	1922.1	1368.1
	10'' up	2106.3	2095.0	2080.8	2007.1	374.1	373.9	367.9	261.9
TOTAL 4'' UP.....		3720.0	3700.0	3675.0	2725.0	2328.0	2327.0	2290.0	1630.0



TABLE 19 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine .....	4''-9'' 10'' up	40.9 104.3	40.8 103.8	39.8 101.5	.....	65.7 46.8	65.3 46.6	62.5 44.5	36.1 25.7
White spruce .....	4''-9'' 10'' up	196.6 443.9	195.8 442.0	191.4 432.0	53.7 18.0	119.3 60.7	118.7 60.3	113.4 57.7	65.5 33.3
Black spruce .....	4''-9'' 10'' up	320.2 98.3	318.8 97.9	311.6 95.7	52.9 9.0	398.4 20.1	396.3 20.0	378.8 19.1	218.7 11.0
Balsam fir .....	4''-9'' 10'' up	264.9 106.6	263.7 106.2	257.8 103.8	179.4 75.4	122.8 34.7	122.2 34.5	116.8 32.9	67.4 19.0
White cedar .....	4''-9'' 10'' up	9.2 7.8	9.2 7.8	9.0 7.6	6.6 15.7	5.4 14.8	5.4 14.7	5.2 14.0	3.0 8.1
Larch .....	4''-9'' 10'' up	.....	.....	.....	.....	26.5 2.8	26.3 2.8	25.1 2.7	14.6 1.5
TOTAL CONIFERS .....	4''-9'' 10'' up	831.8 760.9	828.3 757.7	809.6 740.6	292.6 118.1	738.1 179.9	734.2 178.9	701.8 170.9	405.3 98.6
White birch .....	4''-9'' 10'' up	236.1 190.9	235.1 190.1	229.8 185.8	112.2 70.9	274.7 42.5	273.3 42.3	261.2 40.4	150.8 23.3
Poplar (all) .....	4''-9'' 10'' up	353.3 1897.0	351.8 1889.0	343.9 1846.3	210.6 1669.6	754.0 260.8	749.9 259.4	716.8 247.9	413.9 143.1
TOTAL HARDWOODS .....	4''-9'' 10'' up	589.4 2087.9	586.9 2079.1	573.7 2032.1	322.8 1740.5	1028.7 303.3	1023.2 301.7	978.0 288.3	564.7 166.4
GRAND TOTAL .....	4''-9'' 10'' up	1421.2 2848.8	1415.2 2836.8	1383.3 2772.7	615.4 1858.6	1766.8 483.2	1757.4 480.6	1679.8 459.2	970.0 265.0
TOTAL 4'' UP .....		4270.0	4252.0	4156.0	2474.0	2250.0	2238.0	2139.0	1235.0



TABLE 20. — *Volume of the primary growing stock in cubic feet per acre*  
Central Plateau Section — 1949

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	155.4 211.2	151.8 206.2	132.7 180.3	42.9 28.5	613.3 73.5	596.8 71.5	509.5 61.0	33.3 .....
White spruce.....	4"-9" 10" up	17.0 141.6	16.6 138.3	14.5 120.9	..... 44.5	5.9 14.5	5.7 14.1	4.9 12.0	1.6 .....
Black spruce.....	4"-9" 10" up	1224.1 257.9	1195.4 251.8	1045.3 220.2	595.4 178.8	979.9 73.8	953.4 71.8	814.0 61.3	534.9 44.0
Balsam fir.....	4"-9" 10" up	191.7 55.3	187.2 54.0	163.7 47.2	51.2 3.7	53.2 7.9	51.8 7.7	44.2 6.6	35.8 .....
White cedar.....	4"-9" 10" up	39.5 38.5	38.6 37.6	33.8 32.8	10.3 .....	.....	.....	.....	57.1 60.0
Larch.....	4"-9" 10" up	.....	.....	.....	.....	12.2	11.9	10.2	15.4
TOTAL CONIFERS.....	4"-9" 10" up	1627.7 704.5	1589.6 687.9	1390.0 601.4	699.8 255.5	1664.5 169.7	1619.6 165.1	1382.8 140.9	678.1 104.0
White birch.....	4"-9" 10" up	66.4 66.2	64.9 64.6	56.7 56.5	15.8 18.4	75.9 13.8	73.9 13.4	63.0 11.5	14.6 .....
Poplar (all).....	4"-9" 10" up	31.2 104.0	30.5 101.5	26.7 88.7	9.2 36.3	85.8 28.3	83.5 27.5	71.3 23.5	16.3 .....
TOTAL HARDWOODS.....	4"-9" 10" up	97.6 170.2	95.4 166.1	83.4 145.2	25.0 54.7	161.7 42.1	157.4 40.9	134.3 35.0	30.9 .....
GRAND TOTAL.....	4"-9" 10" up	1725.3 874.7	1685.0 854.0	1473.4 746.6	724.8 310.2	1826.2 211.8	1777.0 206.0	1517.1 175.9	709.0 104.0
TOTAL 4" UP.....		2600.0	2539.0	2220.0	1035.0	2038.0	1983.0	1693.0	813.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	4.5 57.4	4.1 53.5	3.2 41.6	1.3 17.3	85.6 45.1	77.5 40.8	56.5 29.8	21.7 11.5
White spruce.....	4"-9" 10" up	34.6 31.4	32.2 29.3	25.0 22.8	10.4 9.5	11.1 20.2	10.1 18.2	7.3 13.3	2.8 5.1
Black spruce.....	4"-9" 10" up	99.6 7.7	92.7 7.2	72.0 5.6	30.0 2.3	84.4 3.7	76.4 3.3	55.8 2.4	21.4 0.9
Balsam fir.....	4"-9" 10" up	56.8 42.2	52.9 39.3	41.2 30.5	17.1 12.7	22.7 .....	20.5 .....	15.0 .....	5.8 .....
TOTAL CONIFERS.....	4"-9" 10" up	195.5 138.7	181.9 129.3	141.4 100.5	58.8 41.8	203.8 69.0	184.5 62.3	134.6 45.5	51.7 17.5
White birch.....	4"-9" 10" up	671.0 298.6	624.6 278.0	485.6 216.1	201.8 89.8	408.1 23.7	369.3 21.5	269.5 15.7	103.6 6.0
Poplar (all).....	4"-9" 10" up	1408.3 1413.9	1311.0 1316.2	1019.2 1023.2	423.6 425.2	1873.6 262.8	1695.6 237.8	1237.2 173.5	475.5 66.7
TOTAL HARDWOODS.....	4"-9" 10" up	2079.3 1712.5	1935.6 1594.2	1504.8 1239.3	625.4 515.0	2281.7 286.5	2064.9 259.3	1506.7 189.2	579.1 72.7
GRAND TOTAL.....	4"-9" 10" up	2274.8 1851.2	2117.5 1723.5	1646.2 1339.8	684.2 556.8	2485.5 355.5	2249.4 321.6	1641.3 234.7	630.8 90.2
TOTAL 4" UP.....		4126.0	3841.0	2986.0	1241.0	2841.0	2571.0	1876.0	721.0

TABLE 20 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine .....	4''-9'' 10'' up	158.1 350.2	154.1 341.5	130.0 288.1	214.1 .....	360.0 97.4	340.5 92.1	269.1 72.8	122.3 33.1
White spruce.....	4''-9'' 10'' up	81.4 243.0	79.4 236.9	67.0 199.8	9.4 338.1	14.4 32.7	13.6 31.0	10.8 24.4	4.9 11.1
Black spruce.....	4''-9'' 10'' up	366.3 203.3	357.1 198.3	301.2 167.3	121.2 151.2	493.5 69.2	466.8 65.5	368.9 51.7	167.7 23.5
Balsam fir .....	4''-9'' 10'' up	199.4 56.6	194.4 55.2	164.0 46.5	18.1 .....	71.6 31.0	67.7 29.3	53.5 23.2	24.4 10.5
Larch.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	7.5 0.8	7.1 0.8	5.6 0.6	2.5 0.3
TOTAL CONIFERS.....	4''-9'' 10'' up	805.2 853.1	785.0 831.9	662.2 701.7	362.8 489.3	947.0 231.1	895.7 218.7	707.9 172.7	321.8 78.5
White birch.....	4''-9'' 10'' up	453.0 278.8	441.7 271.8	372.6 229.3	98.7 .....	381.9 72.7	361.2 68.8	285.4 54.4	129.8 24.7
Poplar (all) .....	4''-9'' 10'' up	388.8 826.1	379.1 805.5	319.7 679.5	410.2 29.0	902.3 237.0	853.5 224.1	674.5 177.1	306.7 80.5
TOTAL HARDWOODS.....	4''-9'' 10'' up	841.8 1104.9	820.8 1077.3	692.3 908.8	508.9 29.0	1284.2 309.7	1214.7 292.9	959.9 231.5	436.5 105.2
GRAND TOTAL .....	4''-9'' 10'' up	1647.0 1958.0	1605.8 1909.2	1354.5 1610.5	871.7 518.3	2231.2 540.8	2110.4 511.6	1667.8 404.2	758.3 183.7
TOTAL 4'' UP.....		3605.0	3515.0	2965.0	1390.0	2772.0	2622.0	2072.0	942.0





TABLE 21. — *Volume of the primary growing stock in cubic feet per acre*  
Central Transition Section — 1948

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	3.3	3.2	3.1	4.5	.....	.....	.....	.....
	10'' up	160.6	159.0	149.7	220.4	.....	.....	.....	.....
Red pine.....	4''-9''	5.3	5.3	5.0	.....	.....	.....	.....	.....
	10'' up	61.2	60.5	57.0	.....	.....	.....	.....	.....
Jack pine.....	4''-9''	372.9	369.0	347.7	108.3	618.6	609.2	564.2	199.5
	10'' up	372.9	368.9	347.8	342.9	61.2	60.3	55.8	24.7
White spruce.....	4''-9''	53.8	53.3	50.2	72.0	45.1	44.5	41.2	44.9
	10'' up	74.4	73.6	69.4	72.1	14.3	14.0	13.0	21.1
Black spruce.....	4''-9''	654.5	647.6	610.4	226.5	601.9	592.8	549.0	255.7
	10'' up	134.0	132.6	125.0	88.1	31.7	31.2	28.9	41.6
Balsam fir.....	4''-9''	75.6	74.8	70.5	51.1	60.1	59.2	54.8	46.1
	10'' up	7.5	7.4	7.0	3.3	5.9	5.8	5.4	.....
White cedar.....	4''-9''	89.3	88.4	83.3	52.4	23.0	22.6	20.9	104.7
	10'' up	145.8	144.2	136.0	75.5	16.6	16.4	15.2	18.5
Larch.....	4''-9''	.....	.....	.....	.....	28.2	27.8	25.7	.....
	10'' up	.....	.....	.....	.....	1.5	1.5	1.4	.....
TOTAL CONIFERS.....	4''-9''	1254.7	1241.6	1170.2	514.8	1376.9	1356.1	1255.8	650.9
	10'' up	956.4	946.2	891.9	802.3	131.2	129.2	119.7	105.9
White birch.....	4''-9''	56.7	56.1	52.8	49.5	62.1	61.1	56.7	17.6
	10'' up	50.2	49.7	46.9	84.3	25.4	25.0	23.1	20.6
Poplar (all).....	4''-9''	20.5	20.3	19.2	8.0	34.3	33.8	31.3	.....
	10'' up	36.5	36.1	34.0	11.1	20.1	19.8	18.4	.....
TOTAL HARDWOODS.....	4''-9''	77.2	76.4	72.0	57.5	96.4	94.9	88.0	17.6
	10'' up	86.7	85.8	80.9	95.4	45.5	44.8	41.5	20.6
GRAND TOTAL.....	4''-9''	1331.9	1318.0	1242.2	572.3	1473.3	1451.0	1343.8	668.5
	10'' up	1043.1	1032.0	972.8	897.7	176.7	174.0	161.2	126.5
TOTAL 4'' UP.....		2375.0	2350.0	2215.0	1470.0	1650.0	1625.0	1505.0	795.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	23.8	22.6	19.4	.....	48.8	44.1	33.9	.....
	10'' up	53.1	50.3	43.2	.....	76.2	68.9	53.1	.....
White spruce.....	4''-9''	53.3	50.6	43.4	.....	21.0	19.0	14.6	.....
	10'' up	60.2	57.0	49.0	.....	14.0	12.6	9.8	.....
Black spruce.....	4''-9''	27.4	26.0	22.4	.....	23.7	21.4	16.4	20.7
	10'' up	9.2	8.7	7.4	.....	3.8	3.5	2.7	.....
Balsam fir.....	4''-9''	27.1	25.7	22.1	24.5	27.9	25.2	19.4	.....
	10'' up	9.5	9.0	7.7	.....	2.1	1.9	1.5	.....
TOTAL CONIFERS.....	4''-9''	131.6	124.9	107.3	24.5	121.4	109.7	84.3	20.7
	10'' up	132.0	125.0	107.3	.....	96.1	86.9	67.1	.....
White birch.....	4''-9''	553.1	524.4	450.4	325.7	483.8	437.4	336.7	185.8
	10'' up	285.0	270.2	232.0	554.6	106.2	96.0	73.9	14.0
Poplar (all).....	4''-9''	639.6	606.4	520.8	240.9	1337.1	1208.7	930.6	543.6
	10'' up	1918.7	1819.1	1562.2	536.1	355.4	321.3	247.4	135.9
Red maple.....	4''-9''	.....	.....	.....	68.2	.....	.....	.....	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4''-9''	1192.7	1130.8	971.2	634.8	1820.9	1646.1	1267.3	729.4
	10'' up	2203.7	2089.3	1794.2	1090.7	461.6	417.3	321.3	149.9
GRAND TOTAL.....	4''-9''	1324.3	1255.7	1078.5	659.3	1942.3	1755.8	1351.6	750.1
	10'' up	2335.7	2214.3	1901.5	1090.7	557.7	504.2	388.4	149.9
TOTAL 4'' UP.....		3660.0	3470.0	2980.0	1750.0	2500.0	2260.0	1740.0	900.0

TABLE 21 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9'' 10'' up	5.9 189.2	5.6 182.2	5.2 168.5	..... 433.2	1.5 12.0	1.4 11.1	1.1 8.9	.....
Red pine.....	4''-9'' 10'' up	0.4 36.2	0.4 34.8	0.3 32.3	.....	.....	.....	.....	.....
Jack pine.....	4''-9'' 10'' up	167.5 311.0	161.2 299.4	149.1 277.0	.....	279.3 164.0	259.4 152.3	206.9 121.5	72.6 42.6
White spruce.....	4''-9'' 10'' up	95.5 169.7	91.9 163.4	85.0 151.1	44.8 234.9	103.9 55.9	96.5 51.9	77.0 41.4	51.5 30.2
Black spruce.....	4''-9'' 10'' up	138.0 51.0	132.8 49.1	122.9 45.4	21.6 64.6	215.8 11.4	200.5 10.6	160.0 8.4	80.6 13.1
Balsam fir.....	4''-9'' 10'' up	103.8 21.2	99.8 20.5	92.4 18.9	130.2 21.2	94.1 7.1	87.5 6.6	69.8 5.2	40.4 3.5
White cedar.....	4''-9'' 10'' up	18.5 39.4	17.8 37.9	16.5 35.1	41.9 132.6	10.3 7.7	9.5 7.2	7.6 5.7	.....
TOTAL CONIFERS.....	4''-9'' 10'' up	529.6 817.7	509.5 787.3	471.4 728.3	238.5 886.5	704.9 258.1	654.8 239.7	522.4 191.1	245.1 89.4
Yellow birch.....	4''-9'' 10'' up	6.9 38.8	6.6 37.4	6.1 34.6	.....	.....	.....	.....	.....
White birch.....	4''-9'' 10'' up	452.5 254.6	435.6 245.1	402.9 226.7	254.1 381.1	480.1 91.4	446.0 84.9	355.7 67.7	197.6 88.8
Poplar (all).....	4''-9'' 10'' up	237.0 710.9	228.1 684.4	211.0 633.0	181.7 161.1	515.2 200.3	478.5 186.1	381.7 148.4	165.0 74.1
TOTAL HARDWOODS.....	4''-9'' 10'' up	696.4 1004.3	670.3 966.9	620.0 894.3	435.8 542.2	995.3 291.7	924.5 271.0	737.4 216.1	362.6 162.9
GRAND TOTAL.....	4''-9'' 10'' up	1226.0 1822.0	1179.8 1754.2	1091.4 1622.6	674.3 1428.7	1700.2 549.8	1579.3 510.7	1259.8 407.2	607.7 252.3
TOTAL 4'' UP.....		3048.0	2934.0	2714.0	2103.0	2250.0	2090.0	1667.0	860.0

Common and Botanical Names of Tree Species  
included in Timber Estimates.

CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

HARDWOODS

Hard maple.....	<i>Acer saccharum</i> Marsh.
Yellow birch.....	<i>Betula lutea</i> Michx. f.
White elm.....	<i>Ulmus americana</i> L.
Red maple.....	<i>Acer rubrum</i> L.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.

## *Notes*

---



## *Notes*

---

## *Notes*

---







**Hon. Welland S. Gemmell**  
*Minister*

**F. A. MacDougall**  
*Deputy Minister*

Report No. 5 of the  
**GERALDTON DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management  
Ontario Department of Lands and Forests

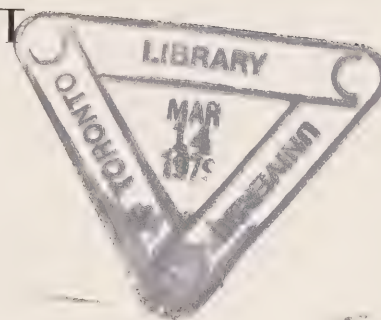




# *Forest Resources Inventory*

— 1953 —

Report No. 5 of the  
GERALDTON DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests

# PREFACE

● One of the important undertakings of the Ontario Department of Lands and Forests in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to the province one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources of the province the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two additional districts. The inventory covers the accessible forest area of the province, totalling 172,000 square miles. This report deals with the results of the inventory in the Geraldton district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the province as a whole. This objective can be given material effect, through the use of the forest resources inventory data in the preparation and effective carrying into practice long term management plans.



# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	SAWLOGS VS. PULPWOOD.....	14
FOREST INVENTORY.....	9	ALLOWABLE CUT.....	18
AREAS.....	9	UTILIZATION VS. ALLOWABLE CUT.....	20
FOREST LAND OWNERSHIP.....	9	APPENDIX.....	22
AGE CLASSES.....	10	SURVEY METHODS.....	22
REGIONAL FOREST TYPES.....	11	MEAN ANNUAL INCREMENT.....	22
COVER TYPES.....	11	ROTATION.....	22
VOLUME.....	13	ALLOWABLE CUT.....	23
CONIFERS VS. HARDWOODS.....	14	CULL FACTOR.....	23

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES, GERALDTON DISTRICT.....	9	FIG. 9 — VOLUME OF THE PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LAND BY SIZE CLASSES.....	15
FIG. 2 — GERALDTON DISTRICT, 1951.....	10	FIG. 10 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOOD SPECIES ON CROWN LAND BY SIZE CLASSES.....	16
FIG. 3 — ECOLOGICAL DIVISIONS.....	11	FIG. 11 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE GERALDTON DISTRICT.....	19
FIG. 4 — CLASSIFICATION OF PRODUCTIVE FOREST LANDS INTO COVER TYPES.....	12	FIG. 12 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND	20
FIG. 5 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY AGE CLASSES.....	13	FIG. 13 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LANDS IN THE GERALDTON DISTRICT.....	21
FIG. 6 — CLASSIFICATION OF VOLUMES ON CROWN LAND BY COVER TYPES AND AGE CLASSES, GERALDTON DISTRICT.....	13	FIG. 14 — AREA COMPANY INVENTORY USED.....	22
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	14		
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	15		







# SURVEY HIGHLIGHTS

1. The total area of the Geraldton district is 7,884,547 acres or 12,320 square miles, 79 per cent of the area is productive forest land, 2 per cent is non-forested land, 11 per cent is non-productive land and 8 per cent is water surface.

2. The total area of the Geraldton district is almost wholly in the ownership of the Crown; only 1,113 acres are privately owned.

3. The forests of the district are predominantly mature with 57 per cent mature, 23 per cent immature, 12 per cent young growth and 8 per cent reproducing forest.

4. The valuable coniferous type is widespread in the district covering 57 per cent of the total area, 30 per cent is mixedwoods, 5 per cent hardwood and 8 per cent reproducing forest.

5. The volume of the primary growing stock is just over 10 billion cubic feet. Conifers make up 67 per cent of the volume and hardwoods 33 per cent.

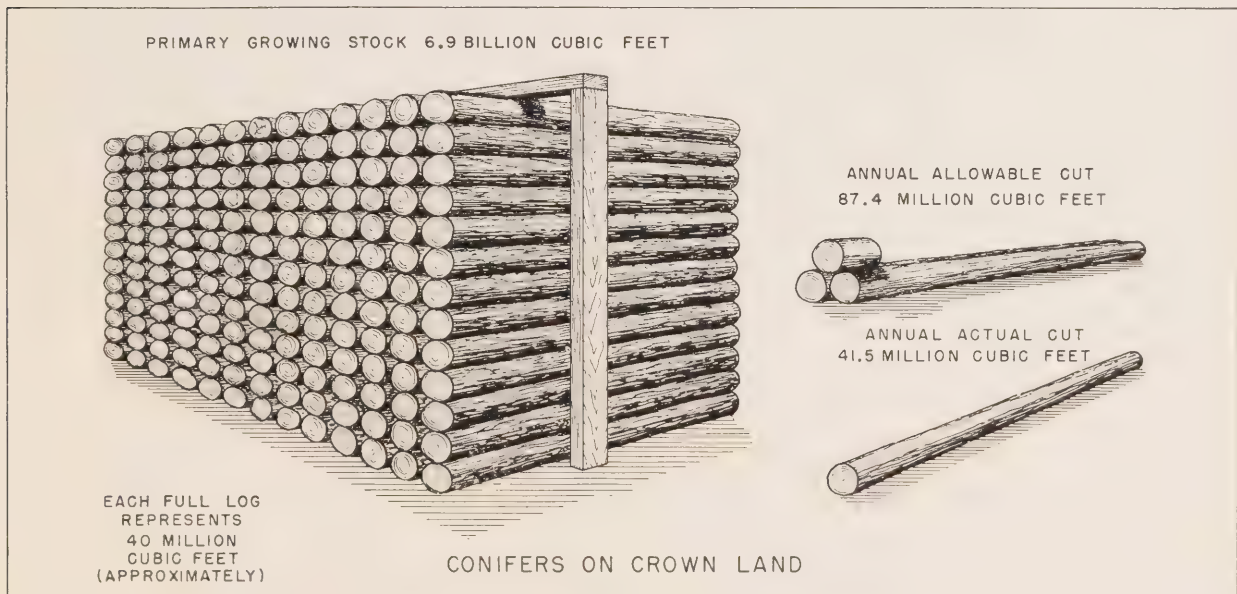
6. The most important species is black spruce which makes up 38 per cent of the total volume, jack pine contributes 13 per cent, white spruce 7 per cent, balsam fir 8 per cent, poplar 20 per cent and

white birch 13 per cent. The balance is made up of small amounts of white cedar and larch.

7. In the mature forest 64 per cent of the volume is in pulpwood size material 4-9 inches d.b.h. and 36 per cent in the sawlog size class 10 inches d.b.h. and over. For conifers in the mature forest, 71 per cent of the volume is in pulpwood size material and 29 per cent in the sawlog size class. White spruce and jack pine are the main sawlog producers. Only 17 per cent of the volume of black spruce is 10 inches d.b.h. and over.

8. The annual allowable cut for Crown lands is 160,718,750 cubic feet. Of this amount 55 per cent is made up of conifers and 45 per cent hardwoods. The annual allowable cut for species making up the conifers shows that 58 per cent is black and white spruce, 28 per cent jack pine, 13 per cent balsam and one per cent other conifers. The allowable cut for hardwoods is 71 per cent poplar and 29 per cent white birch.

9. The utilization of all species in the Geraldton district is currently less than the allowable cut. The cut of conifers is 47 per cent of the allowable cut. Only 6 per cent of the allowable cut for hardwoods is utilized.





MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50

MARCH, 1933





*Forest resources inventory photograph of Town of Geraldton taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area of the Geraldton district included in this report is 7,884,547 acres, or 12,320 square miles. This excludes Indian Reserve lands, all islands in Lake Superior and all that portion of the Geraldton administrative district lying north of 50° 37' 30"N. latitude.

The Geraldton district is essentially a timber-producing area with 6,262,319 acres or 79 per cent of the district area classified as productive forest land (table 1). A total of 838,428 acres or 11 per cent is non-productive forest lands which include lands permanently out of the commercial timber-producing class, due to very low productivity. Non-forested

TABLE 1. — Total area classification into broad land and ownership groupings.

Kind of area	Crown land	Patented land	Total
	<i>acres</i>	<i>acres</i>	<i>acres</i>
Productive forest land <sup>1</sup> .....	6,261,606	713	6,262,319
Non-forested land <sup>2</sup>			
Developed agricultural land.....	1,470	.....	1,470
Grass and meadow land.....	96	162	258
Non-reproducing burn.....	2,435	.....	2,435
Unclassified land <sup>3</sup> .....	164,461	147	164,608
TOTAL.....	168,462	309	168,771
Non-productive forest <sup>4</sup>			
Open muskeg.....	245,663	.....	245,663
Treed muskeg (scrub).....	510,805	.....	510,805
Brush, alder and flooded land.....	24,161	36	24,197
Rock outcrop.....	33,921	.....	33,921
Barrens.....	23,787	55	23,842
TOTAL.....	838,337	91	838,428
Water.....	615,029	.....	615,029
TOTAL AREA.....	7,883,434	1,113	7,884,547

<sup>1</sup> Land bearing, or capable of bearing, timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

lands cover 168,771 acres or 2 per cent of the total area. In this classification are the developed agricultural lands with 1,470 acres, grass and meadow lands with 258 acres and 167,043 acres including lands

occupied by settlements, villages, roads and railroads or otherwise withdrawn from timber production use. Water occupies 615,029 acres or 8 per cent of the total area (fig. 1).

The forests of the Geraldton district have been under intensive utilization for less than 25 years. The two large pulp manufacturing plants operating in the district have been established within the past

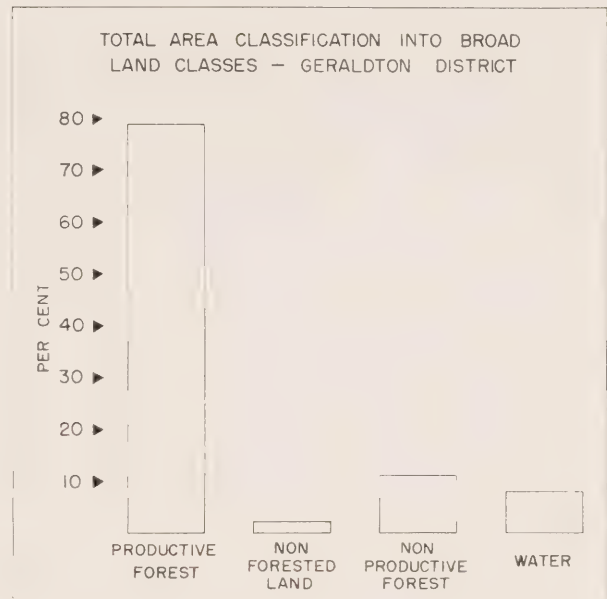


FIGURE 1

decade. The mining industry is active in the central and northern part of the district. Settlement in the district is sparse, confined to a few towns and villages along the railroads, mainly connected with forestry and mining activities.

## Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted and sold under various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort, and for other uses. All of these various types of ownership are grouped under "Patented Lands" which include all lands owned privately in contrast

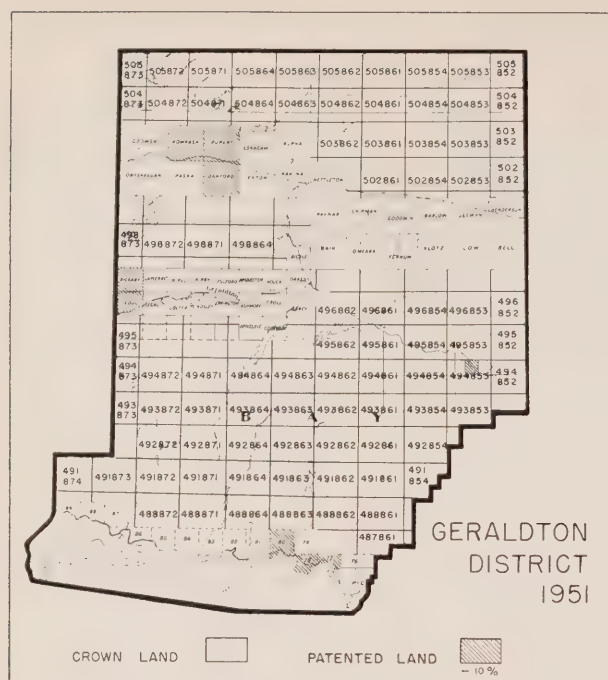


FIGURE 2

to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at time patent is issued, while on some patented lands all timber is reserved to the Crown. The ownership of timber on privately owned lands presents a complicated picture. In the course of the inventory no attempt has been made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

The Geraldton district is practically all Crown land with 7,883,434 acres in Crown ownership and 1,113 acres patented land (fig. 2). Within the district there are 1,470 acres of developed agricultural land all of which appears under Crown ownership. There is little opportunity for agricultural expansion in the district and it seems probable that activities in the district will continue to centre around mining and forestry pursuits.

### Age Classes

During the course of the inventory the productive forest was classified into three main age classes, mature, immature and young growth. The mature age class includes all stands at rotation age or over. Two sub-classes were recognized in the mature age class, 1a mature decadent stands and 1b mature healthy stands. The immature age class includes all stands between one-third rotation age and rotation

age. The immature age class was also divided into two sub-classes 11a including all stands from two-thirds rotation age to rotation age and 11b stands one-third to two-thirds rotation age. Throughout the inventory the smallest trees included in the volume estimates were 3.6 inches d.b.h. The mature and immature age classes contain all of the volume of timber included in the inventory. Young growth includes all stands less than one-third rotation age. Included in the young growth age class but recorded separately are the areas of reproducing forests, comprising all areas supporting regeneration, too young to permit of classification into cover types on the basis of species composition.

On Crown lands in the Geraldton district the mature age class occupies 3,551,008 acres or 57 per cent of the productive forest area. The immature age class covers 1,418,487 acres or 23 per cent, 767,964 acres or 12 per cent is young growth and 524,147 acres or 8 per cent is classified as reproducing forest.

TABLE 2. — Classification of productive forest lands into types and age classes.

Age class and cover type	Crown land	Patented land	Total	Productive forest
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	2,289,595	121	2,289,716	37
Hardwood.....	121,794	.....	121,794	2
Mixedwoods.....	1,139,619	68	1,139,687	18
TOTAL.....	3,551,008	189	3,551,197	57
Immature forest:				
Coniferous.....	738,862	38	738,900	12
Hardwood.....	112,387	2	112,389	2
Mixedwoods.....	567,238	73	567,311	9
TOTAL.....	1,418,487	113	1,418,600	23
Young growth:				
Coniferous.....	537,223	96	537,319	8
Hardwood.....	45,536	.....	45,536	1
Mixedwoods.....	185,205	299	185,504	3
TOTAL.....	767,964	395	768,359	12
Reproducing forest.....	524,147	16	524,163	8
TOTAL PRODUCTIVE FOREST.....	6,261,606	713	6,262,319	100

Of the total area of patented lands in the district amounting to 1,113 acres, 713 acres is classified as



productive forest. This very small area of productive forest lands under private ownership has 189 acres in the mature age class, 113 acres immature, 395 acres young growth and 16 acres classified as reproducing forest.

### *Regional Forest Types*

Portions of three regions or ecological sections are to be found in the Geraldton district (fig. 3):

1. The Coastal Plain section in the north-east covering 5 per cent of the total area.
2. The Central Plateau section in the central portion covers 69 per cent of the total area.
3. Superior section in the south covers 26 per cent of the total area.

For each section separate volume tables are prepared and they serve as units in the compilation of the timber estimates.

The Coastal Plain section is characterized by flat topography and poor drainage leading to the formation of large areas of bogs and muskegs interspersed with areas of higher better-drained areas on which black spruce reaches a development similar to the Clay Belt section farther east in the province. White spruce, balsam fir, poplar and white birch grow with the black spruce along river valleys and in the few areas of well-drained uplands in the interior. No

separate stock tables were prepared for the Coastal plain section as the growth characters of the forest are similar to those of the Clay Belt region on the limited areas on which merchantable forests are found.

The Central Plateau section covering 69 per cent of the area of the Geraldton district is one of the more important timber-producing sections of the province. White and red pine and tolerant hardwoods are absent from the forests of the district. Spruce-fir stands occupy all of the well-drained, heavier soils as a mature forest. These consist of white spruce of large size, black spruce, balsam fir, poplar and white birch. The intolerant hardwoods, poplar and white birch, are very prominent in the composition of the stands in the younger age classes. Jack pine stands, dense and of fine development, are found on coarse sand and gravelly soils. Pure stands of black spruce occur everywhere on low, poorly drained sites, gradually tapering off in growth rate to the open muskegs common to this section. A feature of this section is the fine development of jack pine both as individual trees and in stand production. In these respects it is similar to the Central Transition section in the eastern part of the province.

The Superior section in the south, which occupies about one-quarter of the area of the district, extends along the north shore of Lake Superior. The climate is slightly more humid in this section than prevails throughout the rest of the district. White spruce of good development characterizes this section. There is also a small proportion of jack pine in the forest. The section is generally very rough topographically, especially along the north shore of Lake Superior.

### *Cover Types*

The forests of the Geraldton district are made up of only 8 tree species; 6 species make up 99 per cent of the total volume. Most important among the species represented is black spruce comprising 38 per cent of the total volume. Second in importance among the conifers is jack pine with 13 per cent of the total volume, followed by white spruce and balsam fir with 7 and 8 per cent, respectively of the total volume. The only hardwood or broadleaved species present are the two intolerant species, poplar and white birch, which together make up one-third of the total volume, poplar 20 per cent and white birch 13 per cent.

The forests of the district are separated into three main cover types: coniferous, hardwood and mixed-woods. The coniferous type contains 75 per cent

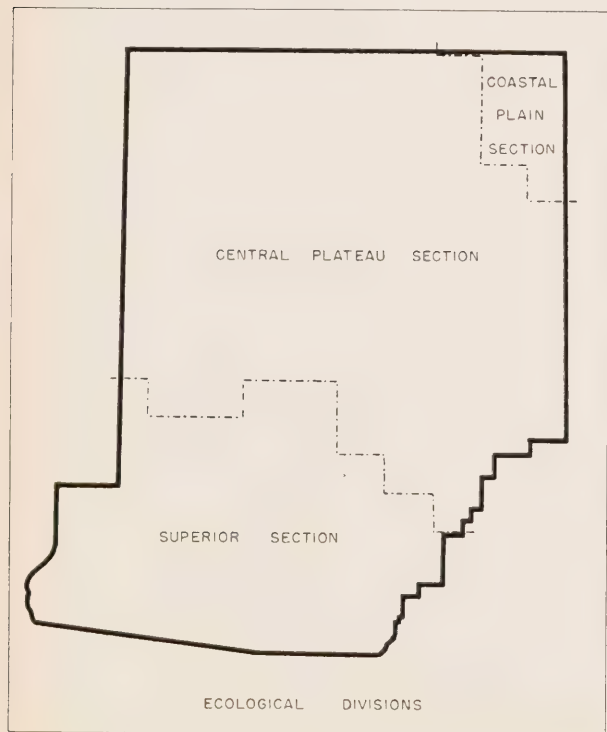


FIGURE 3

or more conifers or softwood trees and the hardwood type, 75 per cent or more hardwood or broad-leaved trees. All other combinations are classed as mixedwoods. Reproducing forests include all areas

TABLE 3. — *Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	2,289,595	36	121	17	2,289,716	36
Immature.....	738,862	12	38	5	738,900	12
Young-growth	537,223	9	96	14	537,319	9
TOTAL.....	3,565,680	57	255	36	3,565,935	57
Hardwood type:						
Mature.....	121,794	2	.....	.....	121,794	2
Immature.....	112,387	2	2	.....	112,389	2
Young growth	45,536	1	.....	.....	45,536	1
TOTAL.....	279,717	5	2	.....	279,719	5
Mixedwood type:						
Mature.....	1,139,619	18	68	10	1,139,687	18
Immature.....	567,238	9	73	10	567,311	9
Young growth	185,205	3	299	42	185,504	3
TOTAL.....	1,892,062	30	440	62	1,892,502	30
Reproducing forest.....	524,147	8	16	2	524,163	8
TOTAL PRODUCTIVE FOREST.....	6,261,606	100	713	100	6,262,319	100

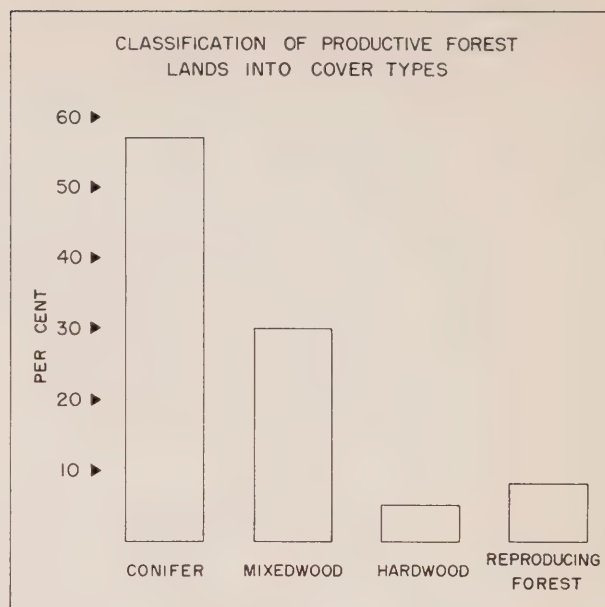


FIGURE 4

of young growth which have not attained a sufficiently stable or complete composition to be classified into types (table 3).

The coniferous type occupies 57 per cent of the productive forest area, 30 per cent is mixedwoods and only 5 per cent hardwood. Eight per cent is reproducing forest (fig. 4). Since there are only 1,113 acres of patented land in the Geraldton district, the percentage figures are the same for Crown lands as for the total productive forest. The areas of patented land in the district are limited to the extent that they are not dealt with separately in this report.



*Planning field work with aid of aerial photographs.*

## Volume

The volume of the primary growing stock includes all living trees 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Geraldton district is over 10 billion cubic feet (10,390,713 thousand cubic feet). This is an average of 1,659 cubic feet per acre (table 4). Of the total quantity, 7.5 billion

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Total
	4''-9'' d.b.h.	10''+ d.b.h.	Average	4''-9'' d.b.h.	10''+ d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1357	773	2130	1455	1089	2544	2130
Immature.....	1587	405	1992	1354	285	1639	1992
Productive forest.....	1129	530	1659	600	334	934	1659

cubic feet is in the mature age class and 2.8 billion cubic feet is in the immature age class (table 5). The mature age class averages 2,130 cubic feet and the immature age class, 1,992 cubic feet per acre.

Since patented lands occupy an area of only 1,113 acres and contain 666 thousand cubic feet, the volume

of the primary growing stock on Crown lands (table 6) does not differ materially from the volume on productive forest lands. The volume of the primary growing stock on Crown lands is 10,390,047 thousand cubic feet, 7.6 billion cubic feet or 73 per cent is in the mature age class and 2.8 billion cubic feet or 27 per cent is in the immature age class (fig. 5). The average stand per acre is the same as for the productive forest land.

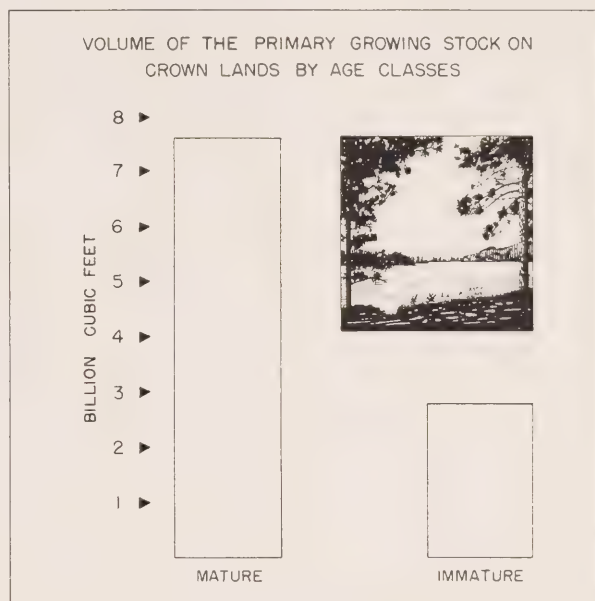


FIGURE 5

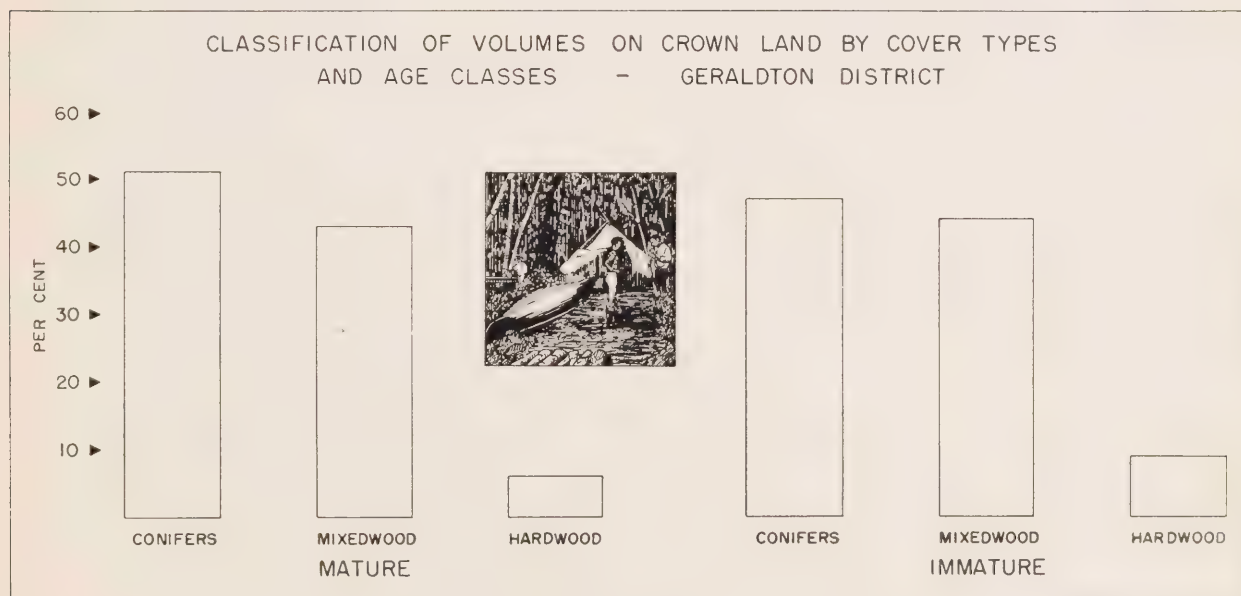


FIGURE 6



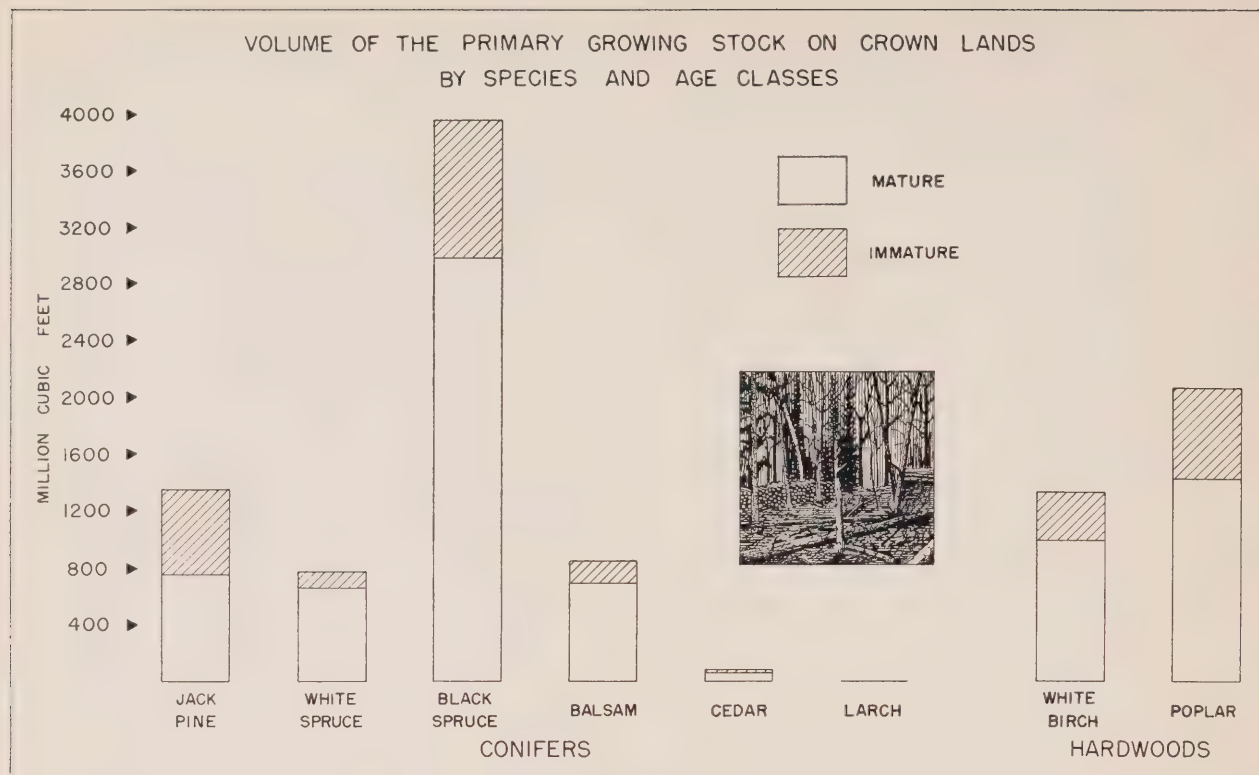


FIGURE 7

Patented lands in the Geraldton district contain 666 thousand cubic feet (table 7) or an average of 934 cubic feet per acre; 481 thousand cubic feet are in the mature age class and 185 thousand cubic feet in the immature age class. The mature age class averages 2,544 cubic feet per acre and the immature age class, 1,639 cubic feet per acre.

#### *Conifers vs. Hardwoods*

Of the total volume of the primary growing stock on productive forest land amounting to 10.4 billion cubic feet, 7 billion cubic feet are conifers and 3.4 billion cubic feet hardwoods (table 8). The conifers make up 67 per cent of the total volume and 33 per cent is hardwoods. The mature age class is dominated by the coniferous type which comprises 51 per cent of the mature volume. The mixedwoods type follows closely with 43 per cent, while the hardwood type contains only 6 per cent of the total mature volume. Approximately the same composition prevails for the immature forest with 47 per cent of the total volume in the coniferous type, 44 per cent in the mixedwood type and 9 per cent in the hardwood type (fig. 6).

The most important conifer is black spruce, which makes up 38 per cent of the total cubic volume on

Crown land, followed by jack pine with 13 per cent of the total volume; white spruce forms 7 per cent and balsam fir 8 per cent. Black spruce and jack pine together constitute 76 per cent of the coniferous volume, white spruce and balsam fir 23 per cent, and the balance is made up of small quantities of white cedar and larch (fig. 7).

The two hardwood species make up 33 per cent of the total volume; poplar forms 20 per cent of the total volume and white birch, 13 per cent.

#### *Sawlogs vs. Pulpwood*

The inventory has shown the volume for two size classes, material 4-9 inches d.b.h. and 10 inches d.b.h. and over. The smaller size class material is regarded as principally of value for pulpwood or cordwood depending on species, although some of this size class material may be diverted to use as poles, posts, railway ties and mining timbers. The larger size class will produce sawlogs and timbers of larger dimensions. A tree 10 inches d.b.h. outside bark will on the average produce one log sixteen feet long, 8 inches in diameter inside bark at the small end. In addition, there is residual smaller size material in the top which may be used as pulpwood or for purposes other than saw timber. The

total quantity of wood in the residual top is relatively small and is included in the 10 inch and over material in all inventory estimates. With a ready market for pulpwood in the Geraldton district all of the material in the tops of sawlog size timber can be utilized for pulpwood.

On Crown lands in the Geraldton district 68 per cent of the total volume is contained in the 4-9 inch diameter class and 32 per cent is in the 10 inch and over class. In the mature forest 4.8 billion cubic feet

is in the 4-9 inch class and 2.7 billion cubic feet in the 10 inch and over class (table 9). For the mature forest 64 per cent of the total volume is in the 4-9 inch size class and 36 per cent in the 10 inch and over size class. For the conifers alone in the mature forest 3.6 billion cubic feet are in the 4-9 inch size class and 1.5 billion cubic feet in the 10 inch and over size class, 71 per cent of the total volume is in the smaller size class and 29 per cent in the 10 inch and over size class. The hardwoods, on the other hand, in the mature age class have almost equal volumes in the two size classes with 49 per cent in the 4-9 inch size class and 51 per cent of the total volume in the 10 inch and over size class. As would be expected, the volume in the immature age class is mainly of the smaller size with 80 per cent of the volume in the 4-9 inch size class and 20 per cent in the 10 inch and over size class (fig. 8).

In considering only the coniferous species in the mature age class on Crown lands, black spruce and balsam fir are almost wholly in the pulpwood size class; white spruce is mainly in the sawlog size class and jack pine is about equally divided between the two size classes. In the immature age class white spruce is about equally divided between the two size classes. All other species are almost wholly in the 4-9 inch size class (fig. 9).

The two hardwood species, poplar and white birch, in the mature age class on Crown lands are about equally divided between the two size classes. Poplar, however, is of much larger size than white

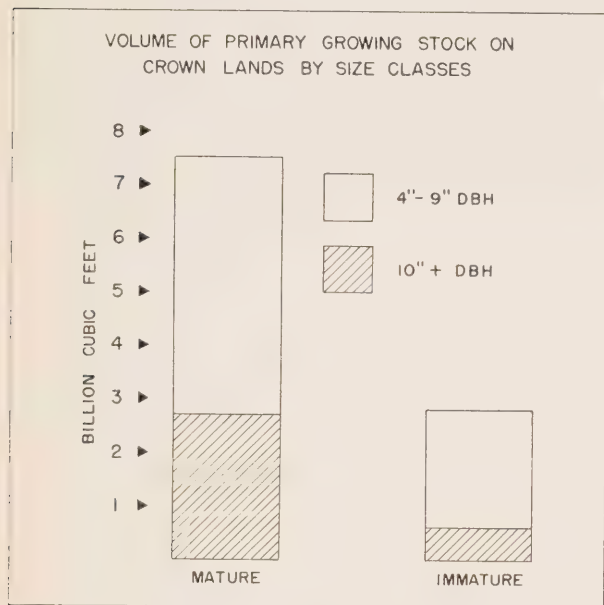


FIGURE 8

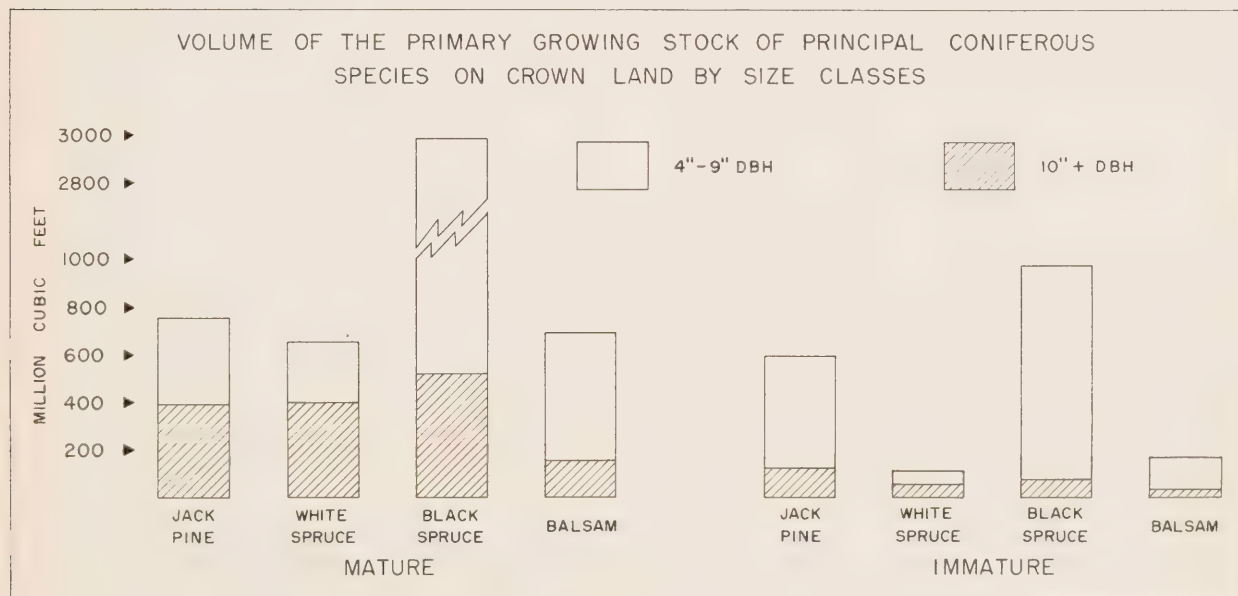


FIGURE 9

birch. Poplar shows 40 per cent of the volume in the 4-9 inch size class and 60 per cent 10 inches and over, while white birch has 61 per cent in the 4-9 inch size class and only 39 per cent in the 10 inch and over size class (fig. 10).

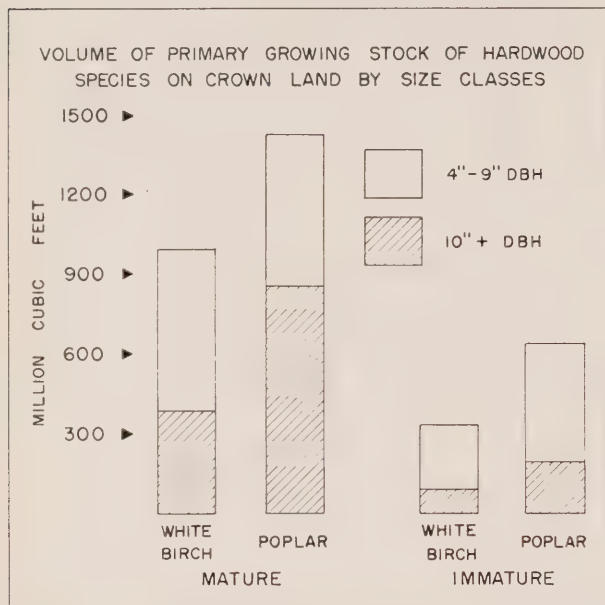


FIGURE 10



Power loading spruce pulpwood preparatory to freighting.

TABLE 5.—Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Geraldton district by species groups, age class and cover type in two size classes.

ALL SPECIES

Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,868,827	1,017,404	1,160,751	160,090	5,207,072
Hardwood.....	209,748	199,135	173,021	74,856	656,760
Mixedwoods.....	1,741,699	1,528,702	917,006	339,474	4,526,881
TOTAL.....	4,820,274	2,745,241	2,250,778	574,420	10,390,713

ALL CONIFERS

Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,726,453	864,383	1,091,548	137,877	4,820,261
Hardwood.....	40,892	18,315	16,175	12,533	87,915
Mixedwoods.....	877,847	618,406	454,881	143,745	2,094,879
TOTAL.....	3,645,192	1,501,104	1,562,604	294,155	7,003,055

ALL HARDWOODS

Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	142,374	153,021	69,203	22,213	386,811
Hardwood.....	168,856	180,820	156,846	62,323	568,845
Mixedwoods.....	863,852	910,296	462,125	195,729	2,432,002
TOTAL.....	1,175,082	1,244,137	688,174	280,265	3,387,658



TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown land in the Geraldton district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,868,649	1,017,313	1,160,693	160,084	5,206,739
Hardwood.....	209,748	199,135	173,017	74,855	656,755
Mixedwoods.....	1,741,602	1,528,587	916,915	339,449	4,526,553
TOTAL...	4,819,999	2,745,035	2,250,625	574,388	10,390,047

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,726,286	864,311	1,091,495	137,872	4,819,964
Hardwood.....	40,892	18,315	16,175	12,533	87,915
Mixedwoods.....	877,798	618,358	454,847	143,737	2,094,740
TOTAL...	3,644,976	1,500,984	1,562,517	294,142	7,002,619

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	142,363	153,002	69,198	22,212	386,775
Hardwood.....	168,856	180,820	156,842	62,322	568,840
Mixedwoods.....	863,804	910,229	462,068	195,712	2,431,813
TOTAL...	1,175,023	1,244,051	688,108	280,246	3,387,428

TABLE 7. — *Cubic-foot volumes of primary growing stock on patented land in the Geraldton district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	178	91	58	6	333
Hardwood.....	.....	.....	4	1	5
Mixedwoods.....	97	115	91	25	328
TOTAL...	275	206	153	32	666

ALL CONIFERS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	167	72	53	5	297
Hardwood.....	.....	.....	.....	.....	.....
Mixedwoods.....	49	48	34	8	139
TOTAL...	216	120	87	13	436

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	11	19	5	1	36
Hardwood.....	.....	.....	4	1	5
Mixedwoods.....	48	67	57	17	189
TOTAL...	59	86	66	19	230

TABLE 8. — *Cubic-foot volume of primary growing stock on productive forest lands in the Geraldton district by species and age classes in two size classes.*

Species	Mature		Immature		Total all lands
	4''-9''	10'' up	4''-9''	10'' up	
	d.b.h.	d.b.h.	d.b.h.	d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Jack pine.....	366,527	391,540	473,293	123,677	1,355,037
White spruce....	254,269	400,648	55,073	55,229	765,219
Black spruce....	2,464,123	520,071	900,137	76,681	3,961,012
Balsam fir.....	533,603	158,278	120,483	31,963	844,327
White cedar.....	26,144	30,410	9,434	6,535	72,523
Larch.....	526	157	4,184	70	4,937
TOTAL CONIFERS	3,645,192	1,501,104	1,562,604	294,155	7,003,055
White birch.....	605,612	387,907	243,789	87,732	1,325,040
Poplar (all).....	569,470	856,230	444,385	192,533	2,062,618
TOTAL HARDWOODS.....	1,175,082	1,244,137	688,174	280,265	3,387,658
TOTAL ALL SPECIES	4,820,274	2,745,241	2,250,778	574,420	10,390,713

TABLE 9. — *Cubic-foot volumes of primary growing stock on Crown lands in the Geraldton district by species and age classes in two size classes.*

Species	Mature		Immature		Total Crown lands
	4''-9''	10'' up	4''-9''	10'' up	
	d.b.h.	d.b.h.	d.b.h.	d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Jack pine.....	366,503	391,500	473,263	123,671	1,354,937
White spruce....	254,262	400,620	55,071	55,227	765,180
Black spruce....	2,463,978	520,033	900,089	76,677	3,960,777
Balsam fir.....	533,568	158,269	120,477	31,962	844,276
White cedar.....	26,139	30,405	9,434	6,535	72,513
Larch.....	526	157	4,183	70	4,936
TOTAL CONIFERS	3,644,976	1,500,984	1,562,517	294,142	7,002,619
White birch.....	605,578	387,878	243,765	87,727	1,324,948
Poplar (all).....	569,445	856,173	444,343	192,519	2,062,480
TOTAL HARDWOODS.....	1,175,023	1,244,051	688,108	280,246	3,387,428
TOTAL ALL SPECIES	4,819,999	2,745,035	2,250,625	574,388	10,390,047

<sup>1</sup> Methods of calculation of allowable cut are given in Appendix, allowable cut, page 23.

<sup>2</sup> Rotation ages by species, table 15, page 22.

TABLE 10. — *Cubic-foot volumes of primary growing stock on patented lands in the Geraldton district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented land
	4''-9''	10'' up	4''-9''	10'' up	
	d.b.h.	d.b.h.	d.b.h.	d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Jack pine.....	24	40	30	6	100
White spruce....	7	28	2	2	39
Black spruce....	145	38	48	4	235
Balsam fir.....	35	9	6	1	51
White cedar.....	5	5	.....	.....	10
Larch.....	.....	.....	1	.....	1
TOTAL CONIFERS	216	120	87	13	436
White birch.....	34	29	24	5	92
Poplar (all).....	25	57	42	14	138
TOTAL HARDWOODS.....	59	86	66	19	230
TOTAL ALL SPECIES	275	206	153	32	666

### Allowable Cut

The calculations of the allowable cut have been carried out for each species by means of a volume formula<sup>1</sup> using an appropriate rotation<sup>2</sup>. The amount of the annual allowable cut results directly from the volume of the primary growing stock and rotation age used for the different species encountered in the district. The present allowable cut volumes, like the volume of the primary growing stock, may be on areas which, at the moment, are inaccessible to operations. The allowable cut volumes may likewise be in stands which due to low net yield are economically inoperable. Taking these conditions into account, the computed allowable cut is regarded as potential, rather than actually obtainable under present operating conditions.

Woods operations are being carried on each year and with present stands growing older, the size and structure of the primary growing stock will change. Hence the calculation of the allowable cut based on the present volume of the primary growing stock is of value for a period of about ten years. On expiration of the initial ten year period the allowable cut should be calculated anew, based on the experience of the first ten year period and in conformity with the actual performance of the forest. With effective

forestry practices allowable cuts for the more valuable species will tend, almost certainly, to increase.

Patented lands in the district cover 1,113 acres, about 0.01 per cent of the district area. Appearing in such a small proportion, the patented lands with their resources have no bearing on the process of regulating yield in the district.

The annual allowable cut, or net depletion allowable under management, in the Geraldton district is 160,734,315 cubic feet, 160,718,750 cubic feet from Crown lands and only 15,565 cubic feet from patented lands. This indicates that almost all allowable cut comes from Crown lands.

#### CROWN LAND

The annual allowable cut for Crown land represents 1.55 per cent of the primary growing stock or 25.7 cubic feet per acre of the productive forest area. Of the total allowable cut, 87,912,945 cubic feet or 55 per cent is coniferous species and 72,805,805 cubic feet or 45 per cent is of hardwood species. Since the rotation is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.3 per cent of the coniferous primary growing stock and 2.1 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 58 per cent is white and black spruce, 28 per cent jack pine, 13 per cent balsam and one per cent other conifers. The relationship of the allowable cut for a ten year

period to the volume of the primary growing stock by species is shown graphically, figure 11.

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Geraldton district.*

Species	Annual allowable cut cu. ft.
Jack pine.....	24,376,605
White spruce.....	9,636,420
Black spruce.....	41,567,250
Balsam fir.....	11,813,910
White cedar.....	456,605
Larch.....	62,155
TOTAL CONIFERS.....	87,912,945

TABLE 12. — *Annual allowable cut for hardwood species on Crown land.*

Species	Annual allowable cut cu. ft.
White birch.....	20,857,440
Poplar.....	51,948,365
TOTAL HARDWOODS.....	72,805,805

The species making up the hardwood content (table 12) shows that 71 per cent is poplar and another 29 per cent white birch. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 12.

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 15,565 cubic feet, with 8,250 cubic feet conifers and 7,315 cubic feet hardwood.

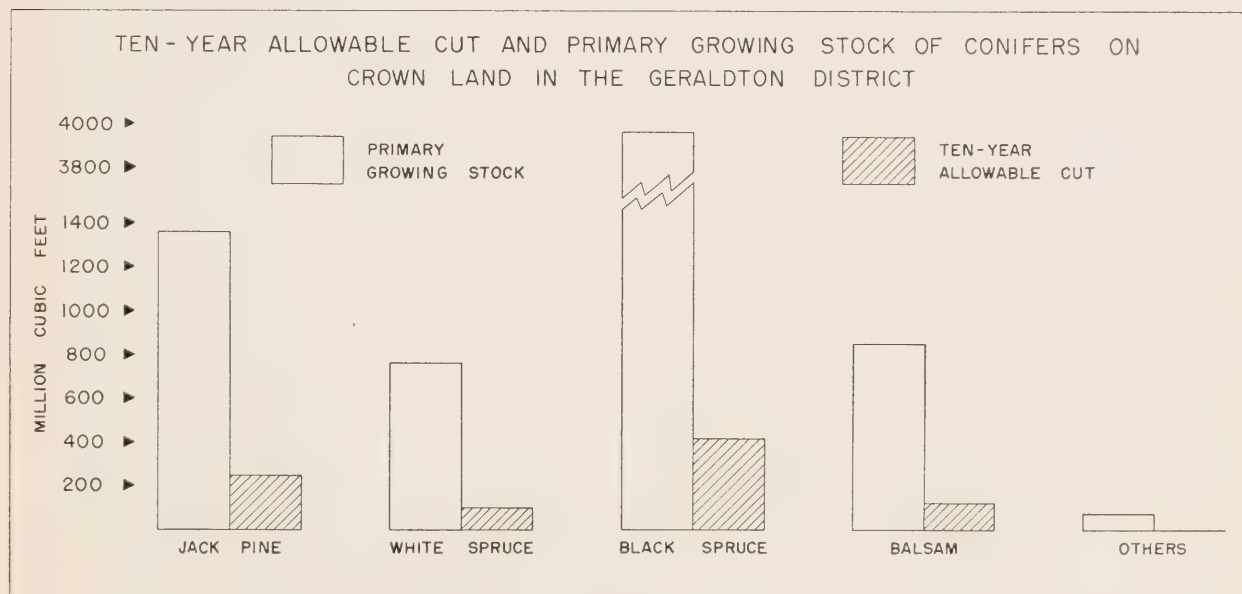


FIGURE 11



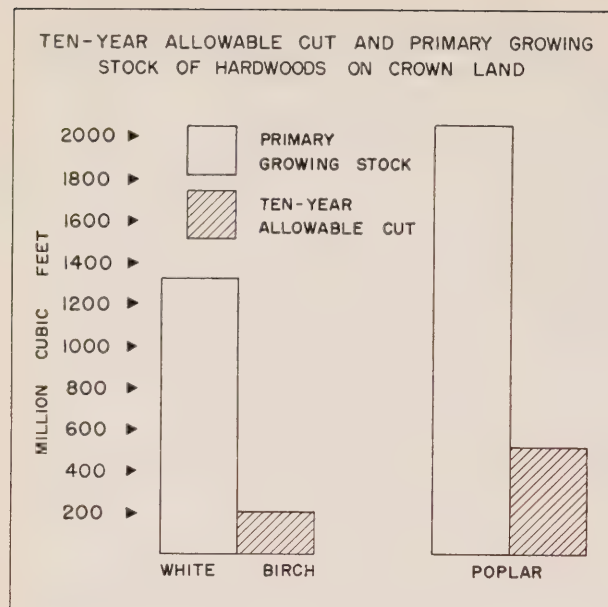


FIGURE 12



*Jack pine in the Geraldton District.*

### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Returns for the period 1946-1949<sup>1</sup>, the following annual average amounts of wood and forest products were cut on Crown lands in the Geraldton district:

Logs and booms.....	7,640,249 F.B.M. Doyle rule
Pulpwood.....	339,013 cords
Fuelwood.....	5,267 cords
Piling.....	32 cords
Poles.....	1,022,605 cubic feet
Piling.....	44,350 cubic feet
Ties.....	33,886 pieces
Posts.....	208 pieces

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet

TABLE 13. — *Gross total cubic volume of wood utilized annually in the Geraldton district.*

Species	Wood utilized cu. ft.	Total per cent
Jack pine.....	17,375,452	38.0
Spruce, white and black.....	21,903,931	47.8
Balsam fir.....	2,192,525	4.8
Cedar.....	886	
<b>TOTAL CONIFERS.....</b>	<b>41,472,794</b>	<b>90.6</b>
White birch.....	143,225	0.3
Poplar.....	4,184,590	9.1
<b>TOTAL HARDWOODS.....</b>	<b>4,327,815</b>	<b>9.4</b>
<b>TOTAL.....</b>	<b>45,800,609</b>	

(table 13) and are comparable with the figures for allowable cut (table 14).

A comparison of the annual allowable cut with the actual cut by species (table 14) indicates that the

TABLE 14. — *Comparison of allowable cut with actual utilization by species.*

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Jack pine.....	24,376	17,375
Spruce, white and black.....	51,204	21,904
Balsam.....	11,814	2,193
Cedar.....	457	1
Larch.....	62	
<b>TOTAL CONIFERS.....</b>	<b>87,913</b>	<b>41,473</b>
White birch.....	20,858	143
Poplar.....	51,948	4,185
<b>TOTAL HARDWOODS.....</b>	<b>72,806</b>	<b>4,328</b>
<b>TOTAL.....</b>	<b>160,719</b>	<b>45,801</b>

<sup>1</sup> Reports of the Minister of Lands and Forests for the Province of Ontario for the fiscal years ending March 31, 1947-1950.

utilization of all species was less than the allowable cut (fig. 13). While the cut of conifers was 47 per cent of the allowable cut, only 6 per cent of the

allowable cut for hardwood species was utilized. Excessive volumes of poplar and white birch remain unutilized on Crown lands in the Geraldton district.

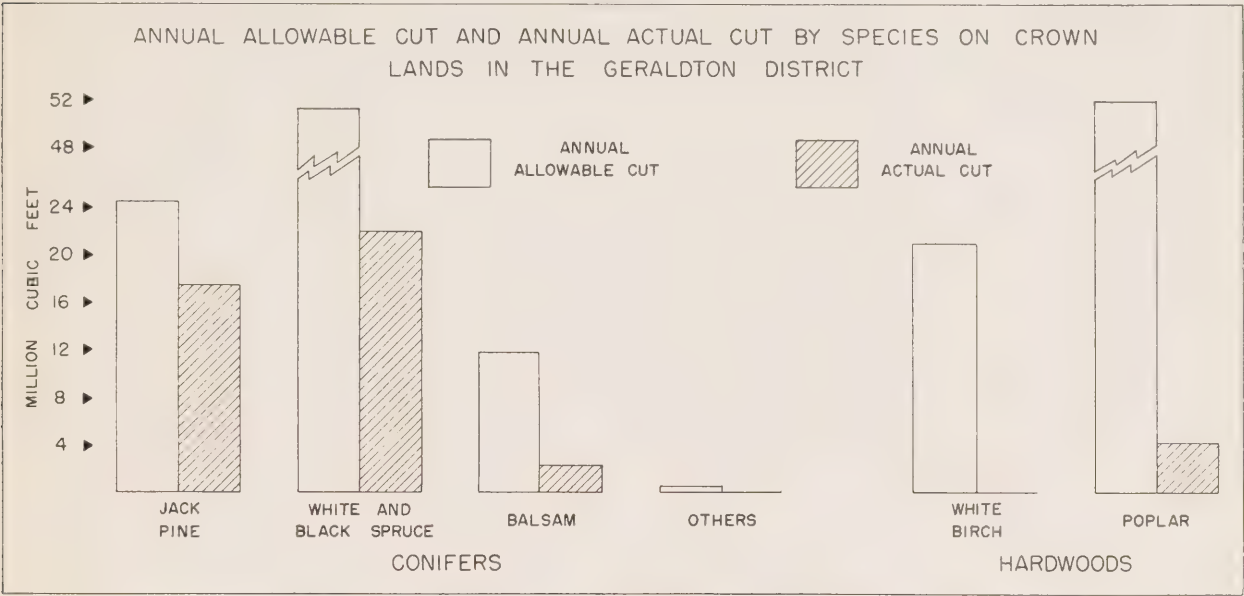


FIGURE 13



*Mature stand of Jack pine on sand plain.*



# APPENDIX

## Survey Methods

The forest resources inventory was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were made by direct photographic interpretation on stereoscopic pairs of photographs and transferred to the base maps.

Systematic sampling was carried out by field crews who collected all of the data necessary for making volume estimates. On completion of the field work finished forest type maps were prepared and areas determined by the usual methods<sup>1</sup>. Field sampling was carried out for the Geraldton district during the summer of 1949.

Volume estimates were prepared for type aggregates. For this purpose, types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre of each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for two of the three regions or ecological sections in the Geraldton district. The Coastal Plain section was summarized with the Clay Belt section. The per acre volumes are shown in tables 17, 18 and 19.

The holder of a licence to cut Crown timber in Ontario is required by Statute to supply a complete inventory of the timber resources on the licenced area. The main area of the Geraldton district is under licence, reports on which form the greater part of the material for this report (fig. 14).

## Mean Annual Increment

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the respective rotation age for each species. The results were totalled and the sum divided by the area of the mature age class.

<sup>1</sup> A complete statement of the methods used in the inventory will be found in — Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

<sup>2</sup> Manual of Timber Management, Dept. of Lands and Forests, Ontario—Part II, page 50.

The mean annual increment for Crown land is 26 cubic feet per acre. This figure should be regarded as approximate, since no age class other than mature was considered in the calculation.

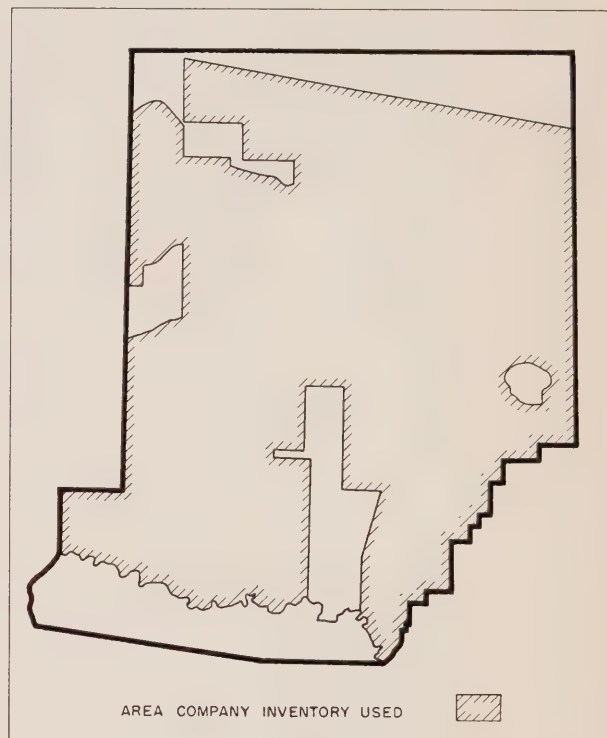


FIGURE 14

## Rotation

In view of the absence of local studies on maturity of stands, the mature age class figures shown in Class Ib<sup>2</sup> have been adopted as the rotation age for

TABLE 15. — *Rotation ages by species on Crown and patented land.*

Species	Crown and patented land years
Jack pine.....	70
White spruce.....	100
Black spruce.....	120
Balsam fir.....	90
White cedar.....	200
Larch.....	100
White birch.....	80
Poplar (all).....	50



all species except jack pine, where a rotation age of seventy years has been chosen as more suitable than that of sixty years as shown in these tables. The actual rotation ages used are shown in table 15.

Allowable Cut

(a) METHOD

The following two bases were available for calculation of allowable cut: (1) the volumes of the mature and immature age classes for each species, and (2) the adopted rotations.

The compilation was carried out in such a way that the volumes were shown by species. This suggests the calculation of allowable cut by individual species separately, rather than for the total primary stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be regarded rather conservative.

(b) FORMULA

In the present calculations the following formula was used:

P = (5/8 (V.1. + V.2.)) / (n/3)

where:

- V.1. — denotes volume of mature timber (Age Class I)
- V.2. — denotes volume of immature timber (Age Class II)
- n — denotes rotation
- P — denotes annual allowable cut

By application of this formula the following figures for the annual allowable cut were obtained:

Crown land.....	239,285,150
Patented land.....	15,565
TOTAL.....	239,300,715

This may be regarded as the maximum annual allowable cut for the district, fully justified if need of intensive utilization was substantiated by the present operations in the district. As may be seen from table 14, the actually utilized annual volume was only 45,800,609 cubic feet on Crown land, or 19 per cent of 239,285,150 cubic feet of the maximum

annual allowable cut on the Crown land in the Geraldton district.

With rather a moderate yet steady demand on wood in view, and with considerable accumulation of mature timber in the district, an advantageous opportunity arises, where by means of a normal, and not the maximum, utilization the normal size of age classes may be obtained, thus a sound foundation would be created for a balanced sustained yield in the future.

During the period of a gradual, and not radical, normalization of age class areas a portion of mature and overmature stands will be held over and above their mature age. This involves certain losses in volume of those stands, where progressing cull may not be balanced by volume increment of ageing stands. These losses, however, are not expected to be of importance inasmuch as the bulk of stands is made of spruce not readily given to decay.

In view of the foregoing, the calculations of the annual allowable cut for Crown lands carried out on the French method principles, were brought to the normal level, according to the following procedure:

Productive forest area — 6,261,606 acres.  
Age Class I volume per acre — 2,130.39 cubic feet.  
Mean annual increment to the rotation age — 25.67 cubic feet.

Thus the average rotation = (2,130.39 / 25.67) = 83 years.

Normal area allotment = (6,261,606 / 83) = 75,441 acres.

Normal allowable cut = 75,441 x 2,130.39 = 160,718,750 cubic feet.

Cull Factor

Where it was found necessary either to calculate net merchantable volumes or to calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, the appropriate cull factors (table 16) were used throughout. These cull factors were taken from the figures for defect made available from operations being carried out in the district.

TABLE 16. — Cull factors by species, Geraldton district.

Species	Cull per cent
Jack pine.....	20
White spruce.....	5
Black spruce.....	5
Balsam fir.....	30
White cedar.....	30
White birch.....	20
Poplar (all).....	40

<sup>1</sup> "Le traité pratique d'aménagement des forêts"—L. Pardé, 1930, Paris

TABLE 17. — *Volume of the primary growing stock in cubic feet per acre*  
Central Plateau Section — 1949

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9'' 10'' up	155.4 211.2	151.8 206.2	132.7 180.3	42.9 28.5	613.3 73.5	596.8 71.5	509.5 61.0	33.3 .....
White spruce.....	4''-9'' 10'' up	17.0 141.6	16.6 138.3	14.5 120.9	..... 44.5	5.9 14.5	5.7 14.1	4.9 12.0	1.6 .....
Black spruce.....	4''-9'' 10'' up	1224.1 257.9	1195.4 251.8	1045.3 220.2	595.4 178.8	979.9 73.8	953.4 71.8	814.0 61.3	534.9 44.0
Balsam fir.....	4''-9'' 10'' up	191.7 55.3	187.2 54.0	163.7 47.2	51.2 3.7	53.2 7.9	51.8 7.7	44.2 6.6	35.8 .....
White cedar.....	4''-9'' 10'' up	39.5 38.5	38.6 37.6	33.8 32.8	10.3 .....	.....	.....	.....	57.1 60.0
Larch.....	4''-9'' 10'' up	.....	.....	.....	.....	12.2	11.9	10.2	15.4
TOTAL CONIFERS.....	4''-9'' 10'' up	1627.7 704.5	1589.6 687.9	1390.0 601.4	699.8 255.5	1664.5 169.7	1619.6 165.1	1382.8 140.9	678.1 104.0
White birch.....	4''-9'' 10'' up	66.4 66.2	64.9 64.6	56.7 56.5	15.8 18.4	75.9 13.8	73.9 13.4	63.0 11.5	14.6 .....
Poplar (all).....	4''-9'' 10'' up	31.2 104.0	30.5 101.5	26.7 88.7	9.2 36.3	85.8 28.3	83.5 27.5	71.3 23.5	16.3 .....
TOTAL HARDWOODS.....	4''-9'' 10'' up	97.6 170.2	95.4 166.1	83.4 145.2	25.0 54.7	161.7 42.1	157.4 40.9	134.3 35.0	30.9 .....
GRAND TOTAL.....	4''-9'' 10'' up	1725.3 874.7	1685.0 854.0	1473.4 746.6	724.8 310.2	1826.2 211.8	1777.0 206.0	1517.1 175.9	709.0 104.0
TOTAL 4'' UP.....		2600.0	2539.0	2220.0	1035.0	2038.0	1983.0	1693.0	813.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9'' 10'' up	4.5 57.4	4.1 53.5	3.2 41.6	1.3 17.3	85.6 45.1	77.5 40.8	56.5 29.8	21.7 11.5
White spruce.....	4''-9'' 10'' up	34.6 31.4	32.2 29.3	25.0 22.8	10.4 9.5	11.1 20.2	10.1 18.2	7.3 13.3	2.8 5.1
Black spruce.....	4''-9'' 10'' up	99.6 7.7	92.7 7.2	72.0 5.6	30.0 2.3	84.4 3.7	76.4 3.3	55.8 2.4	21.4 0.9
Balsam fir.....	4''-9'' 10'' up	56.8 42.2	52.9 39.3	41.2 30.5	17.1 12.7	22.7	20.5	15.0	5.8
TOTAL CONIFERS.....	4''-9'' 10'' up	195.5 138.7	181.9 129.3	141.4 100.5	58.8 41.8	203.8 69.0	184.5 62.3	134.6 45.5	51.7 17.5
White birch.....	4''-9'' 10'' up	671.0 298.6	624.6 278.0	485.6 216.1	201.8 89.8	408.1 23.7	369.3 21.5	269.5 15.7	103.6 6.0
Poplar (all).....	4''-9'' 10'' up	1408.3 1413.9	1311.0 1316.2	1019.2 1023.2	423.6 425.2	1873.6 262.8	1695.6 237.8	1237.2 173.5	475.5 66.7
TOTAL HARDWOODS.....	4''-9'' 10'' up	2079.3 1712.5	1935.6 1594.2	1504.8 1239.3	625.4 515.0	2281.7 286.5	2064.9 259.3	1506.7 189.2	579.1 72.7
GRAND TOTAL.....	4''-9'' 10'' up	2274.8 1851.2	2117.5 1723.5	1646.2 1339.8	684.2 556.8	2485.5 355.5	2249.4 321.6	1641.3 234.7	630.8 90.2
TOTAL 4'' UP.....		4126.0	3841.0	2986.0	1241.0	2841.0	2571.0	1876.0	721.0

TABLE 17 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	158.1	154.1	130.0	214.1	360.0	340.5	269.1	122.3
	10'' up	350.2	341.5	288.1	.....	97.4	92.1	72.8	33.1
White spruce.....	4''-9''	81.4	79.4	67.0	9.4	14.4	13.6	10.8	4.9
	10'' up	243.0	236.9	199.8	338.1	32.7	31.0	24.4	11.1
Black spruce.....	4''-9''	366.3	357.1	301.2	121.2	493.5	466.8	368.9	167.7
	10'' up	203.3	198.3	167.3	151.2	69.2	65.5	51.7	23.5
Balsam fir.....	4''-9''	199.4	194.4	164.0	18.1	71.6	67.7	53.5	24.4
	10'' up	56.6	55.2	46.5	.....	31.0	29.3	23.2	10.5
Larch.....	4''-9''	.....	.....	.....	.....	7.5	7.1	5.6	2.5
	10'' up	.....	.....	.....	.....	0.8	0.8	0.6	0.3
TOTAL CONIFERS.....	4''-9''	805.2	785.0	662.2	362.8	947.0	895.7	707.9	321.8
	10'' up	853.1	831.9	701.7	489.3	231.1	218.7	172.7	78.5
White birch.....	4''-9''	453.0	441.7	372.6	98.7	381.9	361.2	285.4	129.8
	10'' up	278.8	271.8	229.3	.....	72.7	68.8	54.4	24.7
Poplar (all).....	4''-9''	388.8	379.1	319.7	410.2	902.3	853.5	674.5	306.7
	10'' up	826.1	805.5	679.5	29.0	237.0	224.1	177.1	80.5
TOTAL HARDWOODS.....	4''-9''	841.8	820.8	692.3	508.9	1284.2	1214.7	959.9	436.5
	10'' up	1104.9	1077.3	908.8	29.0	309.7	292.9	231.5	105.2
GRAND TOTAL.....	4''-9''	1647.0	1605.8	1354.5	871.7	2231.2	2110.4	1667.8	758.3
	10'' up	1958.0	1909.2	1610.5	518.3	540.8	511.6	404.2	183.7
TOTAL 4'' UP.....		3605.0	3515.0	2965.0	1390.0	2772.0	2622.0	2072.0	942.0





TABLE 18. — *Volume of the primary growing stock in cubic feet per acre*  
Superior Section — 1949

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	178.6	168.8	133.1	.....	290.2	275.4	215.5	.....
	10'' up	121.0	114.4	90.3	.....	84.8	80.4	62.9	.....
White spruce.....	4''-9''	56.1	53.0	41.8	.....	75.1	71.2	55.7	12.9
	10'' up	140.6	133.0	104.8	.....	45.6	43.3	33.9	.....
Black spruce.....	4''-9''	592.1	559.8	441.4	13.0	751.1	712.7	557.6	.....
	10'' up	267.3	252.7	199.3	.....	74.3	70.5	55.2	.....
Balsam fir.....	4''-9''	615.7	582.2	459.1	366.7	298.0	282.8	221.3	542.5
	10'' up	155.9	147.4	116.2	.....	33.9	32.1	25.1	.....
White cedar.....	4''-9''	130.5	123.4	97.3	68.1	132.2	125.5	98.2	.....
	10'' up	144.9	136.9	108.0	30.0	79.0	74.9	58.6	.....
Larch.....	4''-9''	.....	.....	.....	.....	25.8	24.6	19.2	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	1573.0	1487.2	1172.7	447.8	1572.4	1492.2	1167.5	555.4
	10'' up	829.7	784.4	618.6	30.0	317.6	301.2	235.7	.....
White birch.....	4''-9''	170.2	160.9	126.9	19.3	69.5	66.0	51.6	63.2
	10'' up	350.2	331.2	261.1	428.9	81.3	77.2	60.4	.....
Poplar (all).....	4''-9''	34.8	32.9	25.9	.....	77.0	73.1	57.2	26.4
	10'' up	68.1	64.4	50.8	.....	37.2	35.3	27.6	.....
TOTAL HARDWOODS.....	4''-9''	205.0	193.8	152.8	19.3	146.5	139.1	108.8	89.6
	10'' up	418.3	395.6	311.9	428.9	118.5	112.5	88.0	.....
GRAND TOTAL.....	4''-9''	1778.0	1681.0	1325.5	467.1	1718.9	1631.3	1276.3	645.0
	10'' up	1248.0	1180.0	930.5	458.9	436.1	413.7	323.7	.....
TOTAL 4'' UP.....		3026.0	2861.0	2256.0	926.0	2155.0	2045.0	1600.0	645.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	.....	.....	.....	30.3	2.7	2.6	2.0	.....
	10'' up	.....	.....	.....	.....	22.0	20.9	16.0	.....
White spruce.....	4''-9''	39.0	38.5	33.5	.....	37.6	35.9	27.5	.....
	10'' up	47.0	46.3	40.3	24.0	24.0	22.9	17.6	.....
Black spruce.....	4''-9''	22.0	21.7	18.9	20.2	30.5	29.1	22.4	20.2
	10'' up	7.6	7.5	6.6	.....	4.0	3.8	2.9	.....
Balsam fir.....	4''-9''	31.0	30.6	26.6	27.7	45.3	43.2	33.1	.....
	10'' up	16.4	16.2	14.1	.....	16.3	15.6	12.0	.....
White cedar.....	4''-9''	.....	.....	.....	14.3	3.2	3.1	2.4	.....
	10'' up	.....	.....	.....	26.0	1.7	1.6	1.2	.....
Larch.....	4''-9''	.....	.....	.....	.....	.....	.....	.....	23.2
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	92.0	90.8	79.0	62.2	119.3	113.9	87.4	43.4
	10'' up	71.0	70.0	61.0	80.3	68.0	64.8	49.7	.....
White birch.....	4''-9''	608.8	600.6	522.5	387.7	709.0	675.6	519.0	17.3
	10'' up	274.8	271.1	235.9	121.7	203.5	193.9	148.9	.....
Poplar (all).....	4''-9''	1024.4	1010.6	879.3	414.2	923.6	880.0	676.0	544.5
	10'' up	894.0	881.9	767.3	194.9	442.6	421.8	324.0	144.8
TOTAL HARDWOODS.....	4''-9''	1633.2	1611.2	1401.8	801.9	1632.6	1555.6	1195.0	561.8
	10'' up	1168.8	1153.0	1003.2	316.6	646.1	615.7	472.9	144.8
GRAND TOTAL.....	4''-9''	1725.2	1702.0	1480.8	864.1	1751.9	1669.5	1282.4	605.2
	10'' up	1239.8	1223.0	1064.2	396.9	714.1	680.5	522.6	144.8
TOTAL 4'' UP.....		2965.0	2925.0	2545.0	1261.0	2466.0	2350.0	1805.0	750.0

TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	66.3	63.7	53.5	.....	38.3	36.6	29.1	.....
	10'' up	96.7	92.8	78.0	.....	25.8	24.6	19.5	.....
White spruce.....	4''-9''	167.4	160.8	135.1	25.4	155.6	148.5	118.2	35.3
	10'' up	240.0	230.4	193.7	17.8	93.0	88.8	70.6	.....
Black spruce.....	4''-9''	261.1	250.7	210.8	45.8	357.6	341.3	271.6	31.9
	10'' up	75.0	72.0	60.5	.....	34.5	32.9	26.2	.....
Balsam fir.....	4''-9''	351.8	337.8	283.9	217.1	211.3	201.7	160.5	49.1
	10'' up	96.3	92.5	77.8	41.0	37.3	35.6	28.3	.....
White cedar.....	4''-9''	16.2	15.5	13.1	78.4	34.9	33.3	26.4	12.9
	10'' up	31.3	30.1	25.3	141.7	29.2	27.9	22.2	.....
Larch.....	4''-9''	.....	.....	.....	.....	7.7	7.3	5.8	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	862.8	828.5	696.4	366.7	805.4	768.7	611.6	129.2
	10'' up	539.3	517.8	435.3	200.5	219.8	209.8	166.8	.....
White birch.....	4''-9''	595.9	572.2	480.9	64.8	679.7	648.6	516.0	238.4
	10'' up	453.2	435.2	365.7	655.7	230.2	219.7	174.8	72.4
Poplar (all).....	4''-9''	319.0	306.3	257.5	22.3	425.1	405.7	322.8	257.2
	10'' up	624.8	600.0	504.2	.....	202.8	193.5	154.0	163.8
TOTAL HARDWOODS.....	4''-9''	914.9	878.5	738.4	87.1	1104.8	1054.3	838.8	495.6
	10'' up	1078.0	1035.2	869.9	655.7	433.0	413.2	328.8	236.2
GRAND TOTAL.....	4''-9''	1777.7	1707.0	1434.8	453.8	1910.2	1823.0	1450.4	624.8
	10'' up	1617.3	1553.0	1305.2	856.2	652.8	623.0	495.6	236.2
TOTAL 4'' UP.....		3395.0	3260.0	2740.0	1310.0	2563.0	2446.0	1946.0	861.0



TABLE 19. — *Volume of the primary growing stock in cubic feet per acre*  
*Clay Belt Section — 1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	27.1	25.9	22.8	.....	345.6	334.4	289.9	207.2
	10'' up	3.3	3.2	2.8	.....	14.4	13.9	12.1	8.6
White spruce.....	4''-9''	26.8	25.7	22.6	.....	55.8	54.0	46.8	.....
	10'' up	107.3	103.0	90.6	.....	38.8	37.6	32.6	.....
Black spruce.....	4''-9''	1563.2	1500.2	1319.1	626.0	828.4	801.4	695.2	224.9
	10'' up	154.6	148.4	130.5	93.5	43.6	42.2	36.6	11.8
Balsam fir.....	4''-9''	280.6	269.2	236.7	186.2	202.8	196.2	170.2	59.0
	10'' up	53.4	51.3	45.1	.....	8.4	8.2	7.1	2.5
White cedar.....	4''-9''	15.0	14.4	12.7	126.2	26.5	25.6	22.2	83.2
	10'' up	12.8	12.3	10.8	244.9	12.4	12.0	10.4	39.1
Larch.....	4''-9''	6.7	6.4	5.6	.....	22.0	21.3	18.4	.....
	10'' up	0.9	0.9	0.8	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	1919.4	1841.8	1619.5	938.4	1481.1	1432.9	1242.7	574.3
	10'' up	332.3	319.1	280.6	338.4	117.6	113.9	98.8	62.0
White birch.....	4''-9''	10.9	10.4	9.2	.....	40.6	39.2	34.0	.....
	10'' up	72.6	69.7	61.3	.....	10.1	9.8	8.5	.....
Poplar (all).....	4''-9''	19.5	18.7	16.4	53.2	15.0	14.5	12.6	6.5
	10'' up	175.3	168.3	148.0	.....	25.6	24.7	21.4	11.2
TOTAL HARDWOODS.....	4''-9''	30.4	29.1	25.6	53.2	55.6	53.7	46.6	6.5
	10'' up	247.9	238.0	209.3	.....	35.7	34.5	29.9	11.2
GRAND TOTAL.....	4''-9''	1949.8	1870.9	1645.1	991.6	1536.7	1486.6	1289.3	580.8
	10'' up	580.2	557.1	489.9	338.4	153.3	148.4	128.7	73.2
TOTAL 4'' UP.....		2530.0	2428.0	2135.0	1330.0	1690.0	1635.0	1418.0	654.0

SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	.....	.....	.....	.....	6.0	5.8	5.2	2.7
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
White spruce.....	4''-9''	77.5	75.6	68.8	39.5	4.5	4.4	3.9	2.0
	10'' up	180.9	176.3	160.4	92.3	.....	.....	.....	.....
Black spruce.....	4''-9''	108.2	105.6	96.1	55.2	15.1	14.7	13.0	6.7
	10'' up	27.1	26.4	24.0	13.8	2.9	2.8	2.5	1.3
Balsam fir.....	4''-9''	172.3	167.9	152.8	87.9	26.8	26.0	23.1	11.9
	10'' up	57.4	56.0	50.9	29.3	1.7	1.7	1.5	0.8
White cedar.....	4''-9''	3.0	2.9	2.6	1.5	.....	.....	.....	.....
	10'' up	1.1	1.1	1.0	0.6	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	361.0	352.0	320.3	184.1	52.4	50.9	45.2	23.3
	10'' up	266.5	259.8	236.3	136.0	4.6	4.5	4.0	2.1
White birch.....	4''-9''	291.2	284.0	258.3	148.6	103.5	100.6	89.3	46.0
	10'' up	291.1	283.9	258.3	148.5	9.0	8.8	7.8	4.0
Poplar (all).....	4''-9''	491.5	479.3	436.0	250.7	1237.4	1203.6	1068.3	550.2
	10'' up	2399.7	2340.0	2128.8	1224.1	93.1	90.6	80.4	41.4
TOTAL HARDWOODS.....	4''-9''	782.7	763.3	694.3	399.3	1340.9	1304.2	1157.6	596.2
	10'' up	2690.8	2623.9	2387.1	1372.6	102.1	99.4	88.2	45.4
GRAND TOTAL.....	4''-9''	1143.7	1115.3	1014.6	583.4	1393.3	1355.1	1202.8	619.5
	10'' up	2957.3	2883.7	2623.4	1508.6	106.7	103.9	92.2	47.5
TOTAL 4'' UP.....		4101.0	3999.0	3638.0	2092.0	1500.0	1459.0	1295.0	667.0



TABLE 19 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9'' 10'' up	.....	.....	.....	.....	325.9 10.1	304.4 9.4	256.7 7.9	.....
White spruce.....	4''-9'' 10'' up	128.2 238.1	126.8 235.5	113.5 210.8	.....	60.0	56.0	47.3	.....
Black spruce.....	4''-9'' 10'' up	388.9 85.4	384.7 84.5	344.4 75.6	224.9	222.7 9.3	208.0 8.7	175.4 7.3	266.5
Balsam fir.....	4''-9'' 10'' up	323.9 138.8	320.4 137.3	286.8 122.9	104.7	165.6 64.4	154.7 60.1	130.4 50.7	156.0 60.7
White cedar.....	4''-9'' 10'' up	5.9 5.7	5.8 5.6	5.2 5.0	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9'' 10'' up	846.9 468.0	837.7 462.9	749.9 414.3	329.6	774.2 83.8	723.1 78.2	609.8 65.9	422.5 60.7
White birch.....	4''-9'' 10'' up	263.6 349.5	260.8 345.6	233.4 309.4	.....	192.6 21.4	179.9 20.0	151.7 16.8	144.4 109.0
Poplar (all).....	4''-9'' 10'' up	404.9 1523.1	400.5 1506.5	358.5 1348.5	515.0 1094.4	835.2 92.8	780.1 86.7	657.7 73.1	90.4 115.0
TOTAL HARDWOODS.....	4''-9'' 10'' up	668.5 1872.6	661.3 1852.1	591.9 1657.9	515.0 1094.4	1027.8 114.2	960.0 106.7	809.4 89.9	234.8 224.0
GRAND TOTAL.....	4''-9'' 10'' up	1515.4 2340.6	1499.0 2315.0	1341.8 2072.2	844.6 1094.4	1802.0 198.0	1683.1 184.9	1419.2 155.8	657.3 284.7
TOTAL 4'' UP.....		3856.0	3814.0	3414.0	1939.0	2000.0	1868.0	1575.0	942.0

Common and Botanical Names of Tree Species  
included in Timber Estimates.

CONIFERS

Jack pine.....*Pinus banksiana* Lamb  
 White spruce.....*Picea glauca* (Moench) Voss.  
 Black spruce.....*Picea mariana* (Mill) BSP.  
 Balsam fir.....*Abies balsamea* (L.) Mill.

White cedar.....*Thuja occidentalis* L.  
 Larch.....*Larix laricina* (Du Roi) Koch.

HARDWOODS

White birch.....*Betula papyrifera* Marsh.  
 Poplar.....*Populus tremuloides* Michx.  
*Populus tacamahacca* Mill.

## *Notes*

---

## *Notes*

---



## *Notes*

---





**Hon. Welland S. Gemmell**

*Minister*

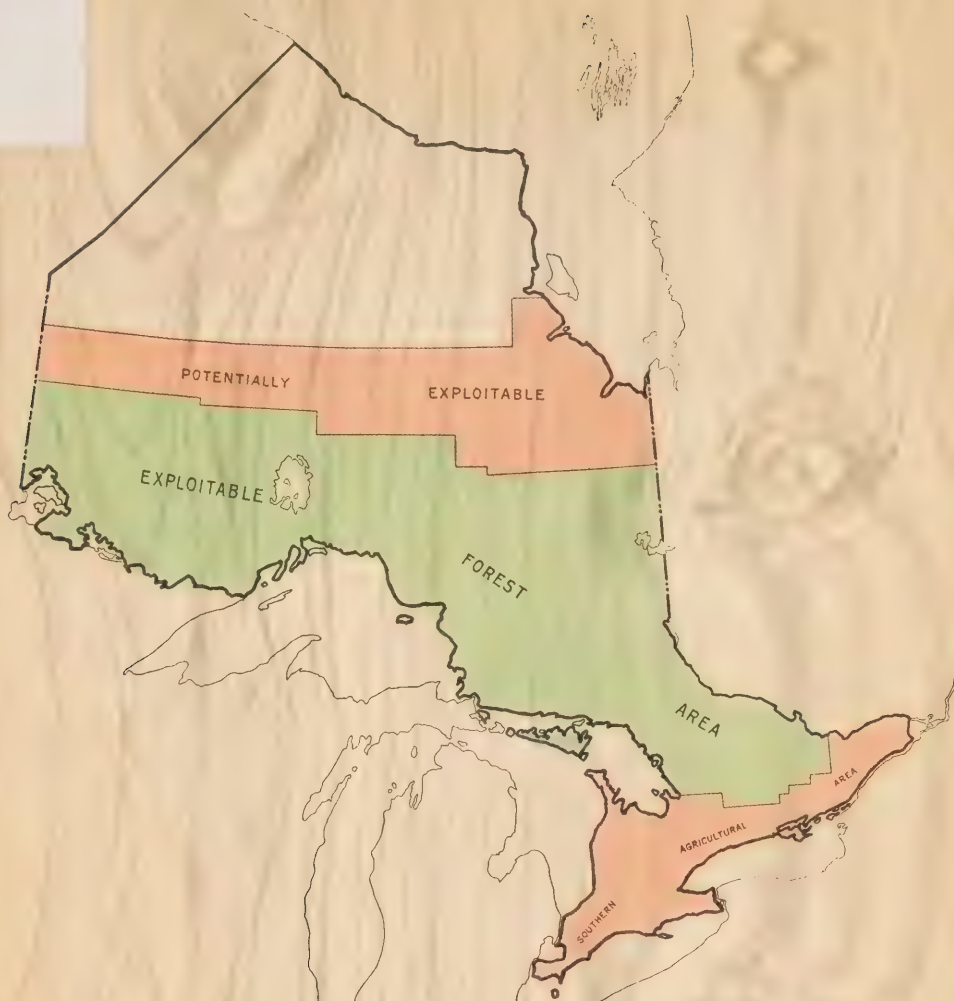
**F. A. MacDougall**

*Deputy Minister*



Report No. 6 of the  
**PORT ARTHUR DISTRICT**

CAZON  
LF  
- F56



# *Forest Resources Inventory*

— 1953 —

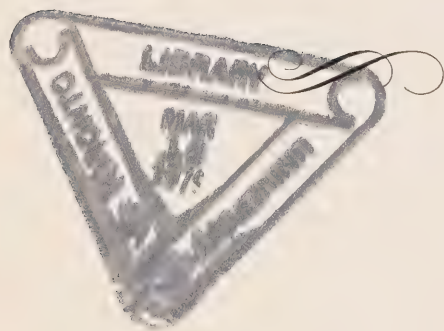
Division of Timber Management  
Ontario Department of Lands and Forests



# *Forest Resources Inventory*

— 1953 —

Report No. 6 of the  
PORT ARTHUR DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests



# PREFACE

● One of the important undertakings of the Ontario Department of Lands and Forests, in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to Ontario, one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

The past half century, little more than one-half a rotation period in forest growth has witnessed the origin and rise of the pulp and paper industry to the position of "Canada's Leading Industry." Advances through research and development in processes of manufacture are going forward at an accelerated rate. The possibilities of manufacturing present wood waste, unused species and qualities economically into marketable products offers a challenge to research; their quantities give it direction. Modern forest inventory has therefore shifted from its former position of concentration on giving presently utilizable volumes, to one of presenting the forest resource picture as a whole. The volume of the primary growing stock in cubic feet gives the total wood resources. From these total figures, not only can the volumes of wood utilizable under present economic and industrial conditions be calculated, but these estimates may be adjusted also, to the progressive change in utilization standards in a rapidly developing economy.

For purposes of administration of the renewable natural resources of the province, the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these administrative districts, totalling 172,000 square miles, and comprising the accessible forest area of Ontario. This report deals with the results of the inventory in the Port Arthur district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial welfare of the province as a whole. This objective may be attained most effectively through the use of inventory data in the planning of sustained yield forest management for the province as a whole and in the preparation of long term management plans for local areas.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	SAWLOGS VS. PULPWOOD.....	14
FOREST INVENTORY.....	9	ALLOWABLE CUT.....	19
AREAS.....	9	UTILIZATION VS. ALLOWABLE CUT.....	21
FOREST LAND OWNERSHIP.....	9	APPENDIX.....	23
AGE CLASSES.....	10	SURVEY METHODS.....	23
REGIONAL FOREST TYPES.....	11	MEAN ANNUAL INCREMENT.....	23
COVER TYPES.....	12	AGE CLASSES.....	23
VOLUME.....	13	ROTATION.....	24
CONIFERS VS. HARDWOODS.....	13	ALLOWABLE CUT.....	24
		CULL FACTOR.....	25

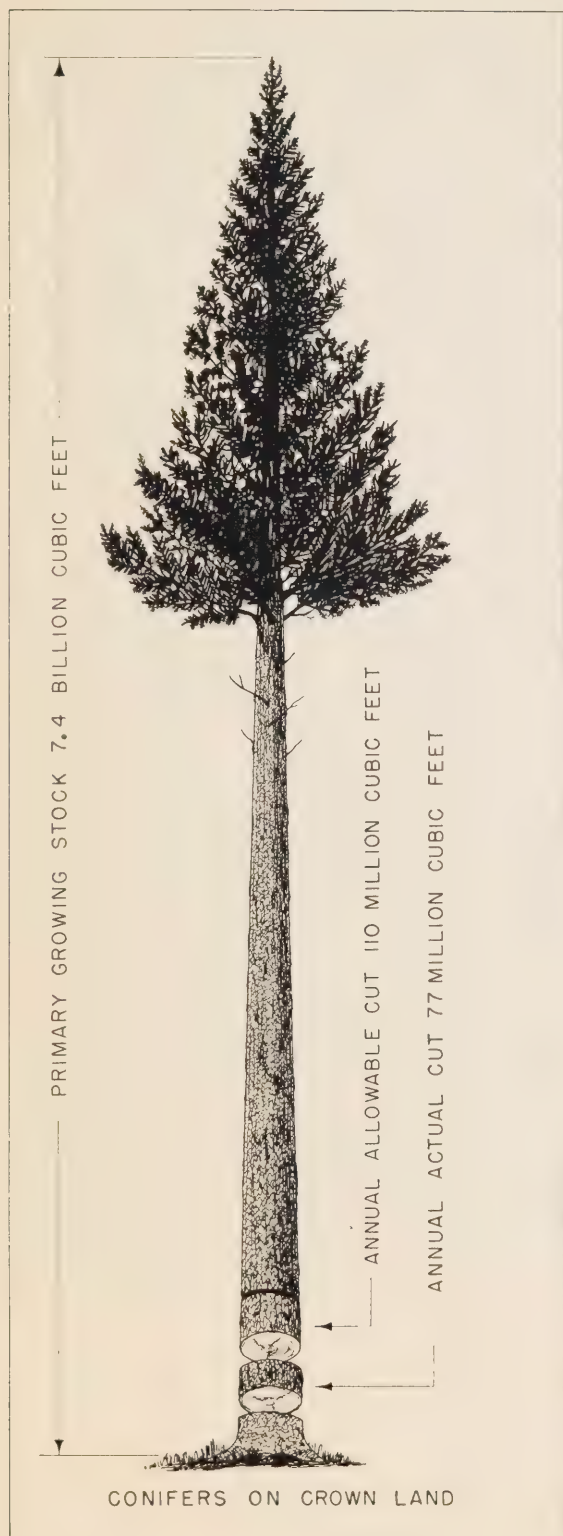
## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND TYPES, PORT ARTHUR DISTRICT.....	9	FIG. 12 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	15
FIG. 2 — PORT ARTHUR DISTRICT, 1951.....	10	FIG. 13 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOOD SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES IN THE PORT ARTHUR DISTRICT.....	16
FIG. 3 — CLASSIFICATION OF PRODUCTIVE FOREST LANDS INTO AGE CLASSES.....	10	FIG. 14. — VOLUME OF PRIMARY GROWING STOCK — MATURE AGE CLASS — PATENTED LANDS — CONIFERS.....	16
FIG. 4 — ECOLOGICAL DIVISIONS.....	11	FIG. 15 — VOLUME OF PRIMARY GROWING STOCK — MATURE AGE CLASS — PATENTED LANDS — HARDWOODS.....	16
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	12	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE PORT ARTHUR DISTRICT.....	20
FIG. 6 — VOLUME OF PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	13	FIG. 17 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND.....	20
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	14	FIG. 18 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LAND IN THE PORT ARTHUR DISTRICT.....	21
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES, PORT ARTHUR DISTRICT.....	14	FIG. 19 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LAND.....	21
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	14	FIG. 20 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LANDS.....	22
FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LANDS BY SIZE CLASSES.....	15	FIG. 21 — AREA COMPANY INVENTORY USED.....	23
FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	15		





# SURVEY HIGHLIGHTS



1. The total area of the Port Arthur district is 10,811,831 acres or 16,893 square miles. Productive forest lands cover 73 per cent of the total area, non-forested lands occupy 2 per cent, non-productive forest lands 7 per cent and water surface 18 per cent.

2. Of the total area of the Port Arthur district 89 per cent is Crown land, 3 per cent is patented land, comprising Grand Trunk Pacific blocks 1-6, and 8 per cent is patented land in small holdings. For the purposes of this report G.T.P. blocks 1-6 are treated as Crown lands.

3. The age class distribution for the productive forest lands of the district shows 40 per cent of the area mature, 35 per cent immature, 15 per cent young growth and 10 per cent reproducing forest.

4. The volume of the primary growing stock in the Port Arthur district is just over 12 billion cubic feet. This is an average of 1,557 cubic feet per acre for the productive forest area of the district.

5. Of the total volume, 63 per cent is made up of conifers or softwood species and 37 per cent is hardwood or broadleaved species.

6. In the mature age class on productive forest lands, 62 per cent of volume of conifers is in the pulpwood or cordwood size class and 38 per cent is of sawlog size. For hardwoods, 44 per cent of the volume is of pulpwood and cordwood size and 56 per cent is in the sawlog size class. Jack pine has 54 per cent of its volume in the mature forest in sawlog sizes, white spruce 72 per cent, black spruce 23 per cent, and balsam fir 29 per cent.

7. The annual allowable cut or total depletion allowable under sustained yield management for the Port Arthur district is 233 million cubic feet, 90 per cent of which is on Crown lands and 10 per cent on patented lands.

8. Of the allowable cut on Crown lands of 210 million cubic feet, 53 per cent is conifers and 47 per cent hardwood species. The allowable cut of conifers is made up of 47 per cent spruce, 32 per cent jack pine, 18 per cent balsam and 3 per cent other conifers. The hardwood allowable cut is made up of two species, 71 per cent poplar and 29 per cent white birch.

9. A comparison of the allowable cut on Crown lands with the current actual utilization shows that spruce is being utilized at approximately the allowable cut under sustained yield management. All other species have a margin for expansion in utilization. Only 4 per cent of the allowable cut for hardwoods is being utilized.







*Forest resources inventory photograph of City of Port Arthur taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*



# FOREST INVENTORY

## Areas

● The total area of the Port Arthur district, excluding Indian Reserve lands, is 10,811,831 acres or 16,893 square miles. Productive forest lands cover 7,909,182 acres (table 1) or 73 per cent of the total area. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 756,697 acres or 7 per cent of the total area. Non-forested lands, including lands permanently withdrawn from timber production, comprise 173,894 acres or 2 per cent of the total area. The water area includes Lake Nipigon and thus occupies the large area of 1,972,058 acres or 18 per cent of the total area (fig. 1).

The non-forested land is composed principally of developed agricultural lands totalling 81,767 acres, pasture and grasslands totalling 10,747 acres and unclassified lands amounting to 73,850 acres made up of land occupied by cities, towns, villages, roads, railroads or otherwise withdrawn from timber production.

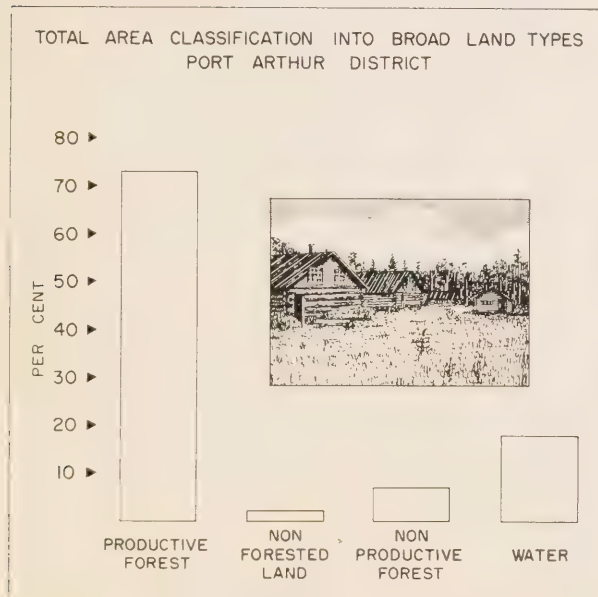


FIGURE 1

The Port Arthur district with 73 per cent of the area classified as productive forest land is an important timber producing area. Centrally located within the district on Lake Superior are the two important cities of Fort William and Port Arthur which are not only important commercial and industrial centres but are

the main shipping points for the Great Lakes traffic in this section of the province. There is therefore not only a strong local demand for wood and wood products but there are also facilities for the shipping of wood and manufactured products to other points in Ontario, to the United States and elsewhere. These activities have made a heavy demand on the productive capacity of the forests of the district.

TABLE 1. — *Total area classification into broad land and ownership groupings.*

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	7,241,554	667,628	7,909,182
Non-forested land <sup>2</sup>			
Developed agricultural land.....	3,314	78,453	81,767
Grass and meadow land.....	7,463	3,284	10,747
Non-reproducing burn.....	7,390	140	7,530
Unclassified land <sup>3</sup> .....	46,723	27,127	73,850
TOTAL.....	64,890	109,004	173,894
Non-productive forest <sup>4</sup> .....			
Open muskeg.....	349,336	2,176	351,512
Treed muskeg (scrub).....	230,111	3,108	233,219
Brush, alder and flooded land.....	103,529	26,161	129,690
Rock outcrop.....	9,943	5,729	15,672
Barrens.....	26,604		26,604
TOTAL.....	719,523	37,174	756,697
Water.....	1,972,058		1,972,058
TOTAL AREA.....	9,998,025	813,806	10,811,831

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

Lands occupied by roads, railroad, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

## Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands



are also patented for mining purposes, summer resort, and other uses. All of these various types of ownership are grouped under "Patented Lands," which include all lands owned privately in contrast to Crown lands. Generally, all pine timber is reserved to the Crown when a patent is issued, while on some mining patents all timber is reserved to the Crown. Owing to the complexity of the ownership of timber on patented lands, no attempt has been made in this report to record separately, timber occurring on patented land but reserved to and owned by the Crown.

In the Port Arthur district, land ownership is further complicated by six Grand Trunk Pacific blocks covering 364,573 acres. This area is actually patented land, but for purposes of this report is included in the Crown land area of the district. The area is managed as a forest property and was not separated from the Crown areas in the company report to the Department of Lands and Forests. For the purposes of all volume calculations and the assessment of the allowable cut these lands are treated as Crown lands in this report.

Of the total area of the Port Arthur district, 9,998,025 acres or 92 per cent is owned by the Crown and 813,806 acres or 8 per cent is patented land. The location of the patented lands is shown in the map of the Port Arthur district, figure 2.

Considering only the productive forest lands of the

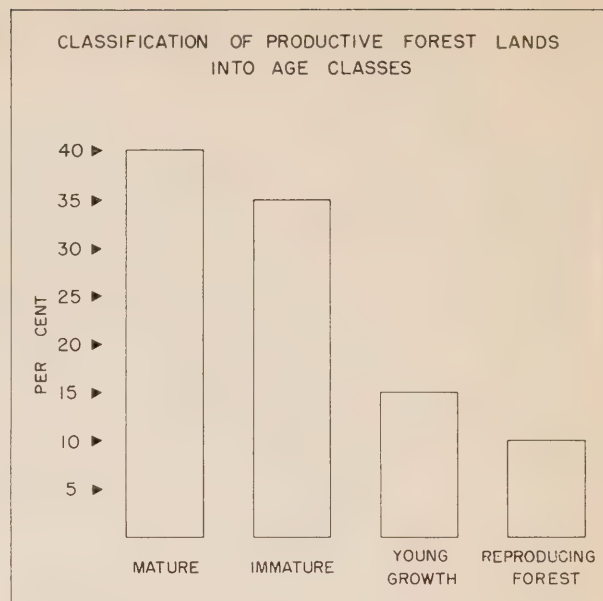


FIGURE 3

district amounting to 7,909,182 acres, 7,241,554 or 92 per cent is in Crown ownership, and 667,628 acres or 8 per cent is patented land.

The important developed agricultural lands of the district amounts to 81,767 acres or 10 per cent of the total patented land area. An additional area of 10,747 acres is grass and meadow land. In the Crown land area there are 3,314 acres of developed agricultural land and 7,463 acres of grass land. For the most part this is on located lands for which letters patent have not been issued.

### Age Classes

For sustained timber yields, a forest should be made up of trees of all age classes and stages of development from seedlings to mature timber, in such proportions that when one group of trees is harvested, another is ready to take its place.

Of the total productive forest area, 3,164,481 acres or 40 per cent is mature, 2,744,175 acres or 35 per cent is immature, and 2,000,526 acres or 25 per cent is made up of young growth and reproducing forest. The deficit in this latter class is balanced by slight excesses in the mature and immature age classes (fig. 3).

The age class distribution for Crown lands (table 2) is similar to the productive forest area. There are 2,912,080 acres or 40 per cent of productive forest on Crown lands in the mature age class, 2,561,476 acres or 35 per cent immature, 997,093 or 14 per cent

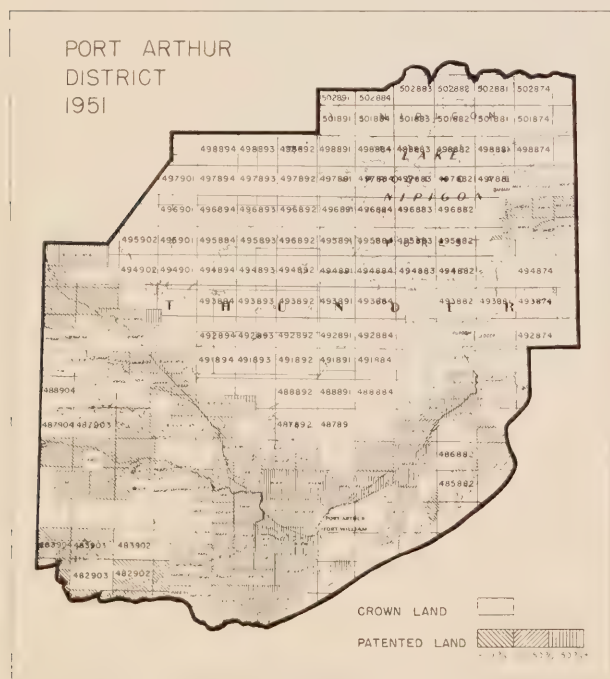


FIGURE 2

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown lands	Patented lands	Total	Productive forest
	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>per cent</i>
Mature forest:				
Coniferous.....	1,482,846	29,801	1,512,647	19
Hardwood.....	243,471	120,587	364,058	5
Mixedwoods.....	1,185,763	102,013	1,287,776	16
TOTAL.....	2,912,080	252,401	3,164,481	40
Immature forest:				
Coniferous.....	1,303,310	46,779	1,350,089	17
Hardwood.....	279,490	65,860	345,350	5
Mixedwoods.....	978,676	70,060	1,048,736	13
TOTAL.....	2,561,476	182,699	2,744,175	35
Young growth:				
Coniferous.....	456,023	15,091	481,114	6
Hardwood.....	171,999	131,025	303,024	4
Mixedwoods.....	359,071	37,875	396,946	5
TOTAL.....	997,093	183,991	1,181,084	15
Reproducing forest.....	770,905	48,537	819,442	10
TOTAL PRODUCTIVE FOREST.....	7,241,554	667,628	7,909,182	100

young growth and 770,905 acres or 11 per cent classed as reproducing forest.

On patented lands the mature forest covers 252,401 acres or 38 per cent of the productive forest on patented lands, 182,699 or 27 per cent is immature, 183,991 acres or 28 per cent is young growth and 48,537 acres or 7 per cent is classed as reproducing forest.

#### *Regional Forest Types*

The distribution of regional forest types, or ecological sections, in Ontario is influenced by the lowering in temperature from south to north and the reduction in rainfall and humidity from east to west. The response of forest growth to these two variable factors is modified by the proximity of large bodies of water, topography, the distribution of broad soil types and other local conditions. These factors influence the distribution of certain commercial tree species, and the volume and growth rate of the forest. Separate volume tables and yield tables are made for each region or section, and they serve as units in the compilation of volume estimates. In the Port Arthur district, four forest regions are recognized. Three of these are components of the Boreal forest,

which is mainly coniferous, and is characterized by long winters, low precipitation and a short frost-free period. The fourth region is a portion of the Great Lakes-St. Lawrence forest, the northern boundary of which is broken by Lake Superior. It is a forest of irregular character whose invasion by the Boreal forest to the north and the deciduous forest to the south has left its ultimate survival open to question. The four ecological sections (fig. 4) are as follows:

1. The Central Plateau section covering the north-east portion of the district and comprising 25 per cent of the total area.

2. The Western Transition section, 37 per cent of the total area, covers the north-west section of the district.

3. The Superior section covers 20 per cent of the area in the south-east portion of the district.

4. The Quetico section in the south-west covers the remaining 18 per cent of the district.

The Central Plateau section occupies the height of land north of Lake Superior. This is a relatively level plateau with widespread sand and gravel deposits, numerous rock outcrops, and swampy depressions. Jack pine and black spruce are the dominant species. These occur as pure stands and also as mixtures with white birch and poplar. The better sites are occupied by white and black spruce, white birch, balsam fir and poplar.

The Western Transition section lies to the north

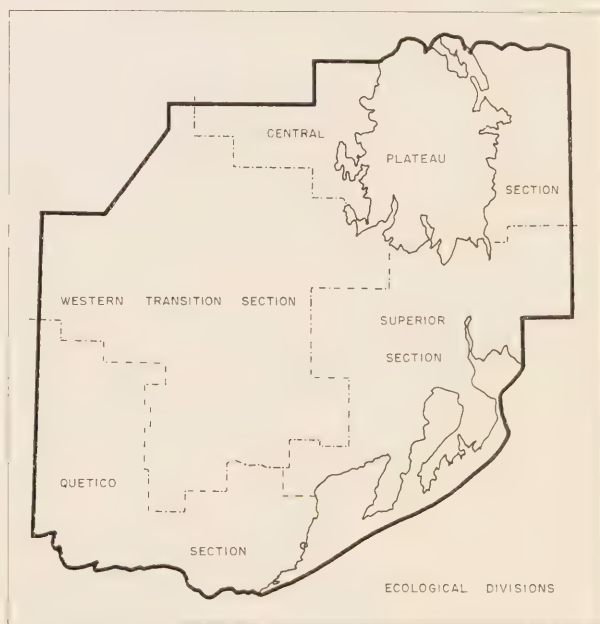


FIGURE 4

of the western extension of the Great Lakes-St. Lawrence forest. It is principally a Boreal forest occupying a rough, rolling topography with thin soil and numerous lakes. The occurrence of white and red pine, over a wide range, as scattered individuals or isolated stands is a characteristic of this region. Jack pine and black spruce comprise the main forest. Mixtures of black and white spruce, balsam fir, white birch and poplar are also common.

The Superior section, lying along the north shore of Lake Superior, has a rough and irregular topography with glacial deposits and much exposed rock. The characteristic association is white spruce with balsam fir, poplar and white birch. Better soils are occupied by white and black spruce, balsam fir, white birch and poplar. In the higher and rocky areas, jack pine, white birch and poorly formed black spruce occur.

The Quetico section, an extension of the Great Lakes-St. Lawrence forest, lies along the international boundary between Lake Superior and the Lake-of-the-Woods. It is covered by a thin, light-textured soil and numerous lakes with rocky shores. Red and white pine stands, with white birch as a component, are characteristic of this region. Following fires in the district, these stands are replaced by jack pine, white and black spruce, balsam fir, white birch, and poplar. Red maple is common throughout the section and hard maple, along with other tolerant hardwoods are known to occur in this section as rare outliers of the eastern hardwood forests.

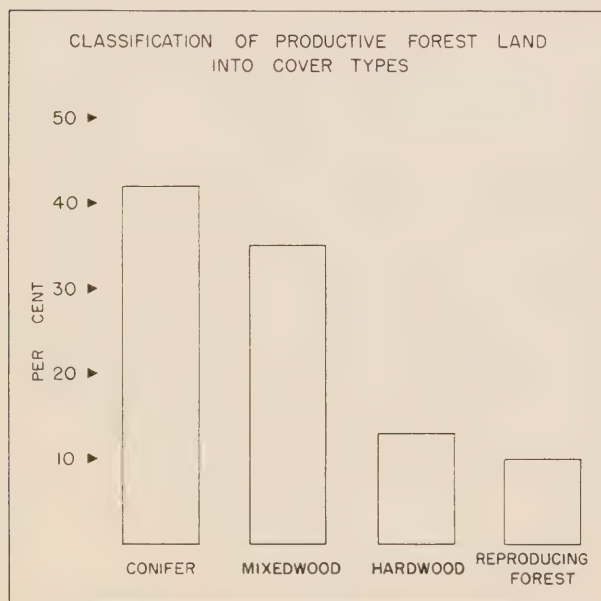


FIGURE 5

## Cover Types

The forests of the Port Arthur district are made up of 12 common tree species, 6 of these make up 98 per cent of the total wood volume. These are: black spruce making up 30 per cent of the growing stock, poplar 22 per cent, white birch 15 per cent, jack pine 15 per cent, balsam fir 10 per cent and white spruce 6 per cent. Represented in the forests are white and red pine, white cedar, larch, red maple and black ash.

The forests are described under three main cover types, coniferous, hardwood and mixedwoods. The coniferous type contains 75 per cent or more conifers or softwood trees, the hardwood type, 75 per cent or more hardwood or broadleaved trees. All other combinations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts, areas of reproducing forests, too recently established to have attained a sufficiently stable composition to be classified into cover types. These areas are referred to as reproducing forest.

Over the productive forest area the coniferous type predominates occupying 42 per cent of the area. It is closely followed by the mixedwoods type which covers 35 per cent of the area, leaving only 13 per

TABLE 3. — *Classification of productive forest lands into cover types.*

Cover type and Age class	Crown lands		Patented lands		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	1,482,846	21	29,801	5	1,512,647	19
Immature.....	1,303,310	18	46,779	7	1,350,089	17
Young growth..	466,023	6	15,091	2	481,114	6
TOTAL.....	3,252,179	45	91,671	14	3,343,850	42
Hardwood type:						
Mature.....	243,471	3	120,587	18	364,058	5
Immature.....	279,490	4	65,860	10	345,350	4
Young growth..	171,999	2	131,025	20	303,024	4
TOTAL.....	694,960	9	317,472	48	1,012,432	13
Mixedwood type:						
Mature.....	1,185,763	16	102,013	15	1,287,776	17
Immature.....	978,676	14	70,060	10	1,048,736	13
Young growth..	359,071	5	37,875	6	396,946	5
TOTAL.....	2,523,510	35	209,948	31	2,733,458	35
Reproducing forest.....	770,905	11	48,537	7	819,442	10
TOTAL PRODUCTIVE FOREST.....	7,241,554	100	667,628	100	7,909,182	100



cent covered by the hardwood type. The remaining 10 per cent of the productive forest is classed as reproducing forest (table 3, fig. 5).

The distribution of cover types on Crown lands is very similar to the total productive forest with 45 per cent coniferous, 35 per cent mixedwoods, 9 per cent hardwood and 11 per cent reproducing forest.

The cover type distribution on patented lands shows a marked difference. The hardwood type predominates covering 48 per cent of the patented area, 31 per cent mixedwoods, 14 per cent coniferous and 7 per cent reproducing forest (table 3).

#### Volume

The volume of the primary growing stock includes all living trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including top and stump and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest land in the Port Arthur district is just over 12 billion cubic feet (12,311,941,000 cubic feet). This is an average of 1,557 cubic feet per acre (table 4). Of this volume 7.4 billion cubic feet (table 5) occurs in the mature age class and 4.9 billion cubic feet in the immature age class (fig. 6).

On Crown lands within the district, the volume of the primary growing stock is 11.5 billion cubic feet (table 6) or an average of 1,585 cubic feet per acre.

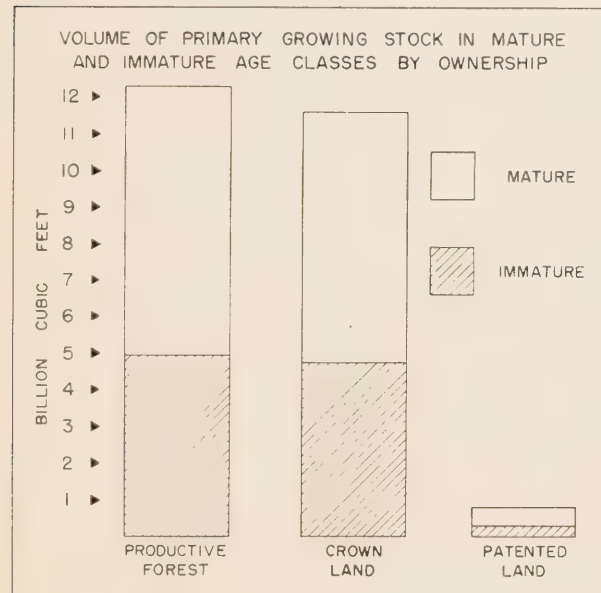


FIGURE 6

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown lands			Patented lands			Average total
	4"-9"	10"+	Average	4"-9"	10"+	Average	
	d.b.h.	d.b.h.		d.b.h.	d.b.h.		
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Mature.....	1,303	1,037	2,340	1,081	1,098	2,179	2,327
Immature.....	1,313	509	1,822	1,174	366	1,540	1,803
Productive forest.....	988	597	1,585	730	515	1,245	1,557

The mature age class contains 6.8 billion cubic feet or 2,340 cubic feet per acre. The immature age class has 4.7 billion cubic feet or 1,822 cubic feet per acre.

Patented lands comprising 8 per cent of the total productive forest area contain 831 million cubic feet (table 7). This quantity is divided between the two age classes with the mature age class containing 550 million cubic feet or 2,179 cubic feet per acre and the immature age class, 281 million cubic feet or 1,540 cubic feet per acre (fig. 6).

#### Conifers vs. Hardwoods

The volume of the primary growing stock on productive forest lands in the Port Arthur district is composed mainly of conifers or softwoods. The volume of conifers is 7.7 billion cubic feet or 63 per cent of the total volume, while hardwoods make up 4.6 billion cubic feet or 37 per cent of the total volume (table 8). In the mature age class conifers with 4.6 billion cubic feet comprise 62 per cent of the mature volume, while hardwoods contain 2.8 billion cubic feet or 38 per cent of the mature volume.

On Crown lands the volume of conifers is 7.4 billion cubic feet or 65 per cent of the total volume. Hardwoods make up 4 billion cubic feet or 35 per cent of total volume (table 9). In the mature age class on Crown lands conifers make up 64 per cent and hardwoods 36 per cent of the mature volume. In the immature forest on Crown lands 65 per cent of the total immature volume is conifers or softwoods and 35 per cent hardwoods. The proportion of softwoods to hardwoods of the mature forest is well maintained in the immature age class.

On patented lands the volume of conifers is 304 million cubic feet or 37 per cent of the total volume, while the volume of hardwoods is 527 million cubic feet or 63 per cent of the total volume (table 10). In the mature age class on patented lands 33 per cent of the volume is conifers and 67 per cent of the mature volume is hardwoods. In the immature age class 44



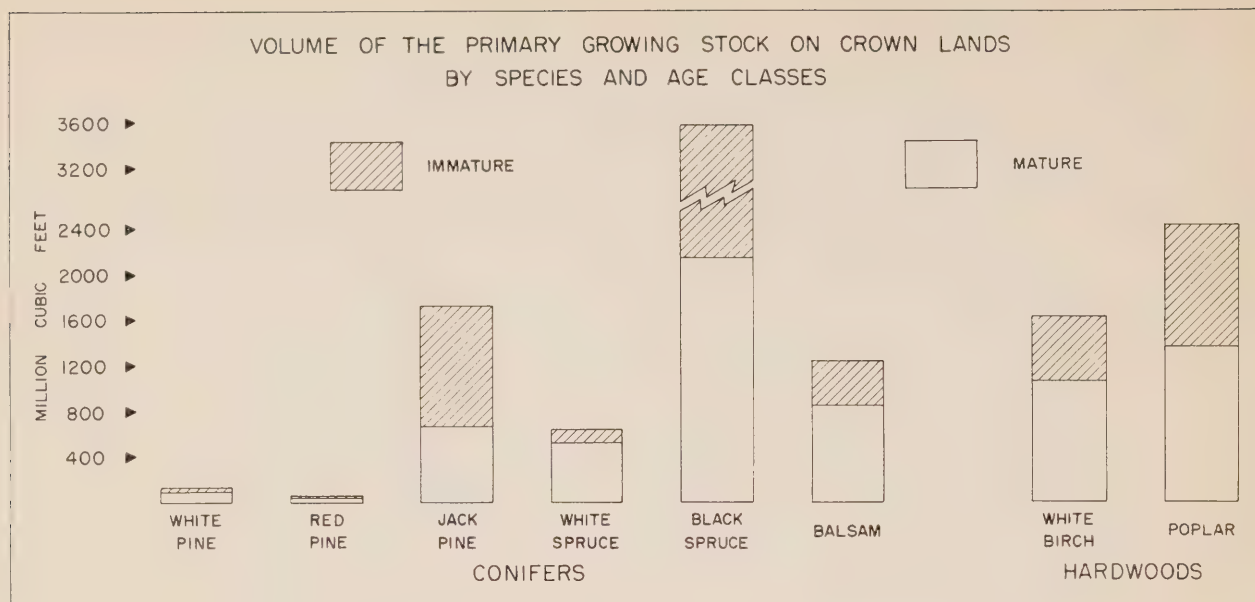


FIGURE 7

per cent of the volume is conifers and 56 per cent hardwoods.

Black spruce and jack pine are the main conifers which along with balsam fir and white spruce make up 96 per cent of the coniferous volume on Crown lands (fig. 7). White and red pine, cedar and larch occur in minor quantities. Only two hardwood species, poplar and white birch, are of importance, poplar making up 60 per cent of the hardwood volume and white birch 40 per cent.

#### *Sawlogs vs. Pulpwood*

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in the smaller size class are considered as mainly of value for pulpwood and cordwood material, depending on species, although poles, posts, railway ties and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for saw timber

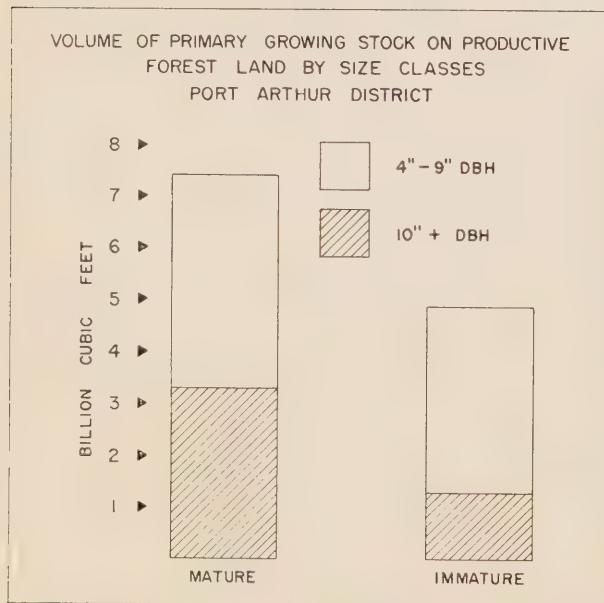


FIGURE 8

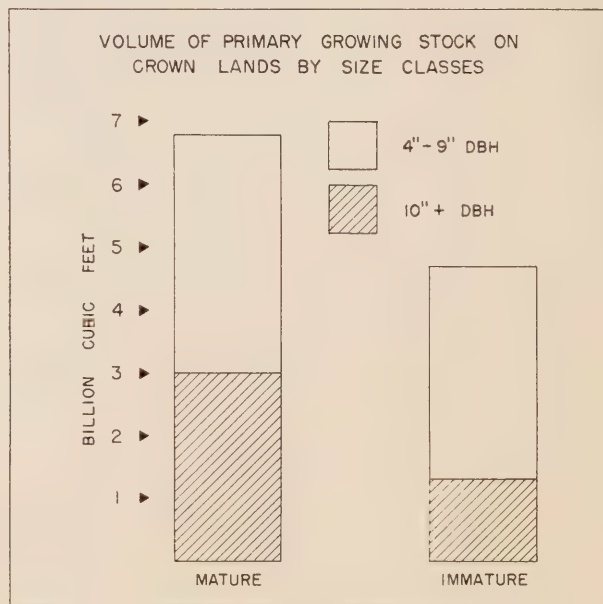


FIGURE 9

and other uses where larger timber is required. From a tree 10 inches d.b.h. outside bark, one sixteen foot log, 8 inches in diameter at the small end inside bark, can on the average be obtained. The residual smaller size material in the top may be diverted to other uses than saw timber. The residual volume is relatively small and is included with the volume 10 inches d.b.h. and over in all inventory figures.

Of the volume of the primary growing stock on productive forest lands 7.6 billion cubic feet are in the 4-9 inch class and 4.7 billion cubic feet in the 10 inch class and over (table 8). Considering only the coniferous species, 68 per cent of the volume is in the smaller size class. The volume of the hardwood species is distributed almost evenly between the two

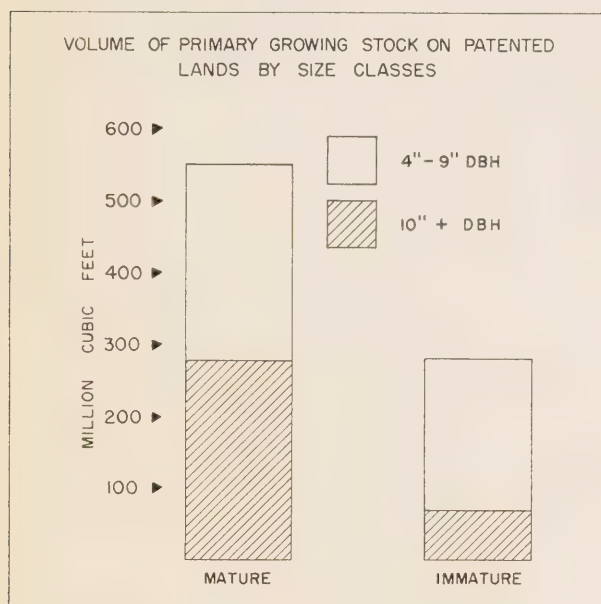


FIGURE 10

size classes having only 4 per cent more volume in the 4-9 inch class than in the 10 inch and over size class.

In the mature age class on productive forest lands 4.1 billion cubic feet are in the 4-9 inch size class and 3.3 billion cubic feet in the 10 inch d.b.h. and over class (fig. 8). Sixty-two per cent of the mature coniferous volume is in the 4-9 inch class and 38 per cent 10 inches and over. For hardwoods the figures are 44 per cent in the 4-9 inch class and 56 per cent in the 10 inch and over class.

On both Crown lands (table 9, fig. 9) and patented lands (table 10, fig. 10) there is a marked similarity in the relationship between the volume in the two size classes with that for the productive forest lands. This

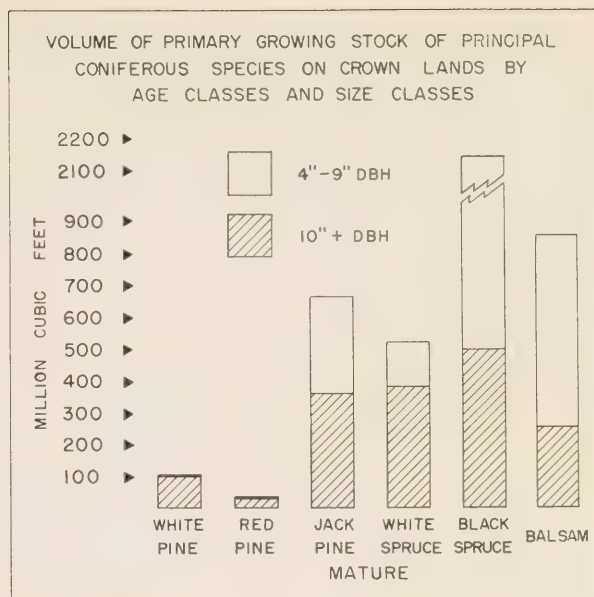


FIGURE 11

also holds true if the species groups, conifers and hardwoods, are considered separately.

On Crown lands 62 per cent of the volume of the mature age class for conifers is in the 4-9 inch size class and 38 per cent 10 inches and over. The volume relationships of the two size classes for the principal coniferous species are shown in figure 11 for the mature and figure 12 for the immature age class which graphically represents table 9. In the mature age class jack pine has 54 per cent of its mature volume

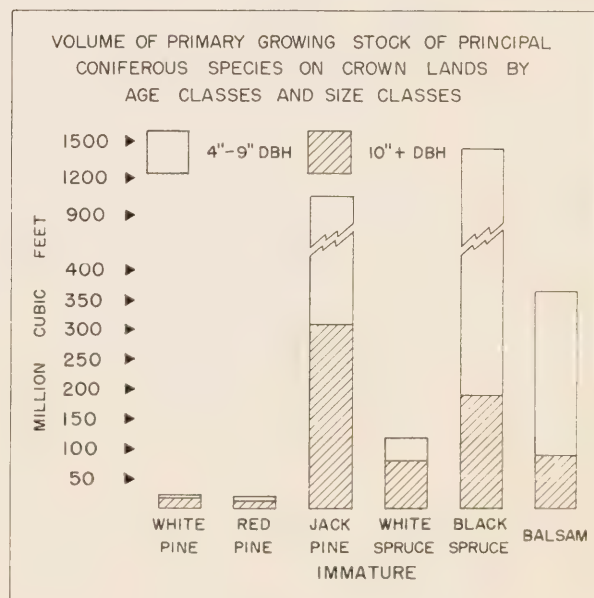


FIGURE 12

in the sawlog size class, white spruce has 74 per cent, black spruce 23 per cent and balsam fir 29 per cent. It is clear that white spruce and jack pine are the main conifers producing sawlog size material while black spruce and balsam fir volumes are for the most part of pulpwood size. The size relationships in the immature age class are of little immediate concern as these stands will not be utilized until they attain rotation age. The distribution of the volume between pulpwood and sawlog size classes by species in the immature age class (fig. 12) indicates that a reduction in the length of the rotation would materially reduce the sawlog volume production of the forest.

For the hardwood species on Crown lands (fig. 13), 64 per cent of the poplar and 47 per cent of the white

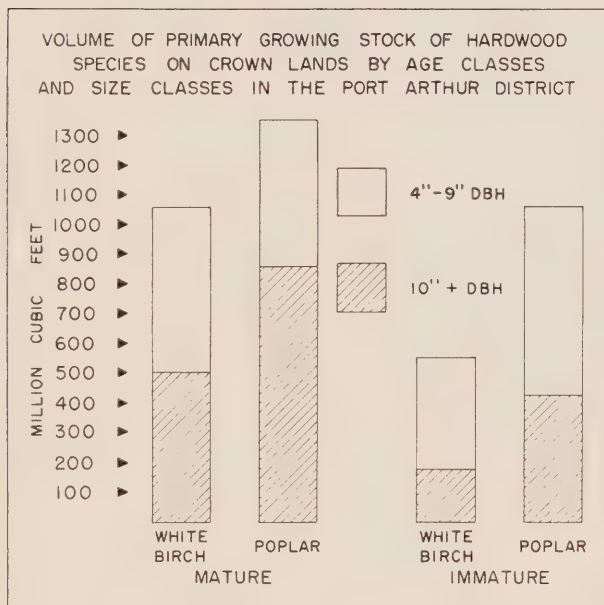


FIGURE 13

birch are in the sawlog size class and although they are utilized only to a very limited extent for saw timber at the present time, their size offers possibilities for further developments in their uses. It should also be noted that poplar in the immature age class has 40 per cent of the volume 10 inches d.b.h. and over and white birch has 31 per cent in the larger size class. The two intolerant hardwood species, therefore, will produce some sawlog size material when managed on a short rotation.

On patented lands in the Port Arthur district the volume in the mature age class is equally divided between sawlog and pulpwood size material (table 10) while the immature age class has 76 per cent of the volume in the 4-9 inch class and 24 per cent 10 inches

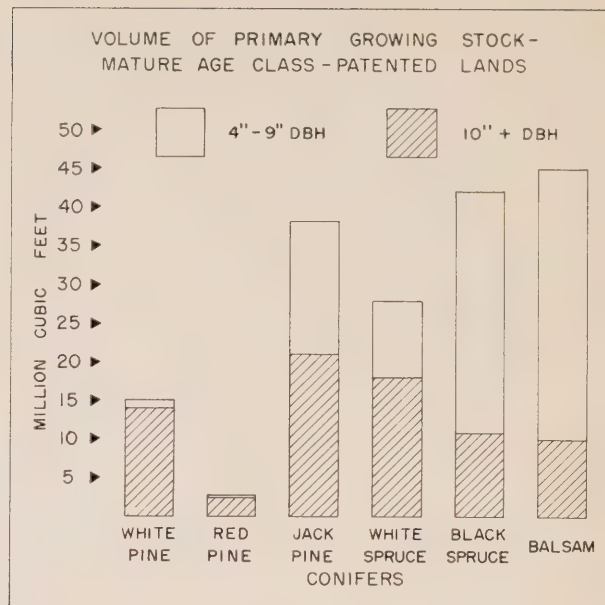


FIGURE 14

and over. Fifty-one per cent of all sawlog timber in the mature forest on patented lands is poplar, another 19 per cent is white birch, leaving only about 30 per cent for all of the valuable coniferous species. The volume of the primary growing stock of conifers is shown in figure 14 by species for the two size classes 4-9 inches d.b.h. and 10 inches and over. The distribution of the hardwood volume between the two size classes is shown in figure 15 for the mature age class on patented lands.

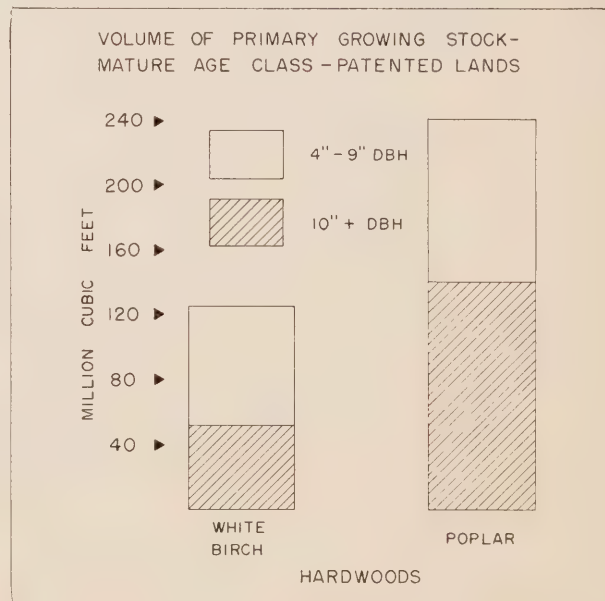


FIGURE 15

TABLE 5. — *Cubic-foot volumes of primary growing stock on productive forest lands in the Port Arthur district by species groups, age classes and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,071,369	1,096,999	1,844,165	480,528	5,493,061
Hardwood.....	483,180	493,630	417,007	218,507	1,612,324
Mixedwoods.....	1,512,628	1,706,058	1,316,496	671,374	5,206,556
TOTAL.....	4,067,177	3,296,687	3,577,668	1,370,409	12,311,941

ALL CONIFERS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,919,224	916,807	1,701,580	390,209	4,927,820
Hardwood.....	66,615	47,869	46,176	36,349	197,009
Mixedwoods.....	851,301	767,870	691,627	305,035	2,615,833
TOTAL.....	2,837,140	1,732,546	2,439,383	731,593	7,740,662

ALL HARDWOODS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	152,145	180,192	142,585	90,319	565,241
Hardwood.....	416,565	445,761	370,830	182,158	1,415,314
Mixedwoods.....	661,327	938,188	624,870	366,339	2,590,724
TOTAL.....	1,230,037	1,564,141	1,138,285	638,816	4,571,279

TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown land in the Port Arthur district by species groups, age classes and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,035,630	1,071,051	1,788,589	465,972	5,361,242
Hardwood.....	359,595	366,475	342,403	198,328	1,266,801
Mixedwoods.....	1,399,082	1,582,059	1,232,228	639,245	4,852,614
TOTAL.....	3,794,307	3,019,585	3,363,220	1,303,545	11,480,657

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,887,302	899,369	1,651,403	379,578	4,817,652
Hardwood.....	58,327	33,489	40,249	32,916	164,981
Mixedwoods.....	792,997	717,044	652,659	291,466	2,454,166
TOTAL.....	2,738,626	1,649,902	2,344,311	703,960	7,436,799

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	148,328	171,682	137,186	86,394	543,590
Hardwood.....	301,268	332,986	302,153	165,412	1,101,819
Mixedwoods.....	606,085	865,015	579,570	347,779	2,398,449
TOTAL.....	1,055,681	1,369,683	1,018,909	599,585	4,043,858



TABLE 7. — *Cubic-foot volumes of primary growing stock on patented lands in the Port Arthur district by species groups, age classes and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	35,739	25,948	55,576	14,556	131,819
Hardwood.....	123,585	127,155	74,604	20,179	345,523
Mixedwoods.....	113,546	123,999	84,268	32,129	353,942
TOTAL.....	272,870	277,102	214,448	66,864	831,284

ALL CONIFERS					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	31,922	17,438	50,177	10,631	110,168
Hardwood.....	8,288	14,380	5,927	3,433	32,028
Mixedwoods.....	58,304	50,826	38,968	13,569	161,667
TOTAL.....	98,514	82,644	95,072	27,633	303,863

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	3,817	8,510	5,399	3,925	21,651
Hardwood.....	115,297	112,775	68,677	16,746	313,495
Mixedwoods.....	55,242	73,173	45,300	18,560	192,275
TOTAL.....	174,356	194,458	119,376	39,231	527,421

TABLE 8. — *Cubic-foot volumes of primary growing stock on productive forest lands in the Port Arthur district by species and age classes in two size classes.*

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	5,439	113,138	5,766	19,958	144,301
Red pine.....	4,652	34,017	7,932	14,337	60,938
Jack pine.....	320,932	378,607	770,173	317,428	1,787,140
White spruce.....	152,310	395,554	46,007	82,331	676,202
Black spruce.....	1,676,834	503,372	1,292,399	193,248	3,665,853
Balsam fir.....	637,619	259,838	295,196	91,307	1,283,960
White cedar.....	39,263	47,866	17,195	12,826	117,150
Larch.....	91	154	4,715	158	5,118
TOTAL CONIFERS.....	2,837,140	1,732,546	2,439,383	731,593	7,740,662
White birch.....	632,800	554,162	422,923	185,077	1,794,962
Poplar (all).....	592,578	1,007,474	713,435	453,120	2,766,607
Red maple.....	2,981	674	1,294	144	5,093
Ash.....	1,678	1,831	633	475	4,617
TOTAL HARDWOODS.....	1,230,037	1,564,141	1,138,285	638,816	4,571,279
TOTAL ALL SPECIES.....	4,067,177	3,296,687	3,577,668	1,370,409	12,311,941

TABLE 9. — *Cubic-foot volumes of primary growing stock on Crown lands in the Port Arthur district by species and age classes in two size classes.*

Species	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	4,508	99,063	5,117	17,164	125,852
Red pine.....	4,303	31,558	7,112	12,774	55,747
Jack pine.....	304,092	357,540	746,456	308,712	1,716,800
White spruce.....	142,520	377,028	38,700	77,231	635,479
Black spruce.....	1,645,397	492,560	1,255,915	189,491	3,583,363
Balsam fir.....	602,931	249,483	274,372	88,596	1,215,382
White cedar.....	34,784	42,516	12,865	9,835	100,000
Larch.....	91	154	3,774	157	4,176
TOTAL CONIFERS.....	2,738,626	1,649,902	2,344,311	703,960	7,436,799
White birch.....	559,794	502,345	380,004	172,537	1,614,680
Poplar (all).....	493,097	866,191	637,408	426,579	2,423,275
Red maple.....	2,146	144	1,039	177	3,746
Ash.....	644	703	458	352	2,157
TOTAL HARDWOODS.....	1,055,681	1,369,683	1,018,909	599,585	4,043,858
TOTAL ALL SPECIES.....	3,794,307	3,019,585	3,363,220	1,303,545	11,480,657

TABLE 10. — *Cubic-foot volumes of primary growing stock on patented lands in the Port Arthur district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented lands
	4" 9" d.b.h.	10" up d.b.h.	4" 9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	931	14,075	649	2,794	18,449
Red pine.....	349	2,459	820	1,563	5,191
Jack pine.....	16,840	21,067	23,717	8,716	70,340
White spruce...	9,790	18,526	7,307	5,100	40,723
Black spruce...	31,437	10,812	36,484	3,757	82,490
Balsam fir.....	34,688	10,355	20,824	2,711	68,578
White cedar.....	4,479	5,350	4,330	2,991	17,150
Larch.....			941	1	942
<b>TOTAL CONIFERS.....</b>	<b>98,514</b>	<b>82,644</b>	<b>95,072</b>	<b>27,633</b>	<b>303,863</b>
White birch.....	73,006	51,817	42,919	12,540	180,282
Poplar (all).....	99,431	141,283	76,027	26,541	343,332
Red maple.....	835	230	255	27	1,347
Ash.....	1,034	1,128	175	123	2,460
<b>TOTAL HARDWOODS.....</b>	<b>174,356</b>	<b>194,458</b>	<b>119,376</b>	<b>39,231</b>	<b>527,421</b>
<b>TOTAL ALL SPECIES.....</b>	<b>272,870</b>	<b>277,102</b>	<b>214,448</b>	<b>66,864</b>	<b>831,284</b>



*Pole skidways and residual stand.*

<sup>1</sup> Method of calculation of allowable cut is given in Appendix, methods, allowable cut, page 24.

<sup>2</sup> Rotation by species, table 16, page 23.

### Allowable Cut

The allowable cut has been calculated for each species with the aid of a volumetric formula<sup>1</sup> and appropriate rotation<sup>2</sup> for species. Thus the amount of the allowable cut results from the volume of the primary growing stock and rotation adopted for each species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may exist on areas which, at the moment, are inaccessible to operations or which are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential rather than actually available under present operating conditions.

The calculation of the allowable cut, based on the present volume of the primary growing stock, is of value for a period of about ten years. This is because of woods operations being carried out and the present stands growing in volume, each year. Therefore, the size and structure of the primary growing stock, regarded as the foundation of the allowable cut calculations, change also from year to year and for that reason, on expiration of the initial ten year period the allowable cut should be calculated anew. With effective forestry practices allowable cuts for the more valuable species will tend to increase; without them the present trend to more and more poplar at the expense of spruces may continue.

The annual allowable cut, or net depletion allowable under management, in the Port Arthur district is 232,626,205 cubic feet; 209,514,305 cubic feet or 90 per cent from Crown lands and 23,111,900 cubic feet, or 10 per cent of the total allowable cut on patented lands.

### CROWN LAND

The annual allowable cut for Crown land represents 1.82 per cent of primary growing stock or 28.9 cubic feet per acre of the productive forest area. Of the total allowable cut 110,293,955 cubic feet or 53 per

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Port Arthur district.*

Species	Annual allowable cut cu. ft.
White pine.....	1,514,130
Red pine.....	804,880
Jack pine.....	35,408,990
White spruce.....	9,174,705
Black spruce.....	43,112,300
Balsam fir.....	19,496,785
White cedar.....	721,875
Larch.....	60,290
<b>TOTAL CONIFERS</b>	<b>110,293,955</b>

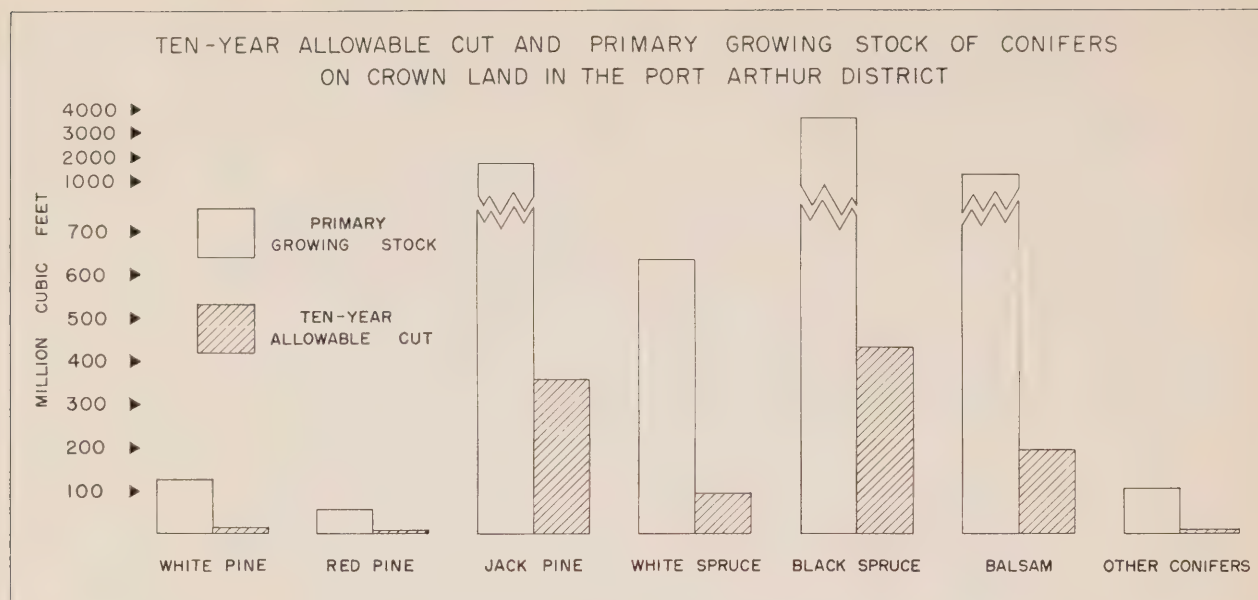


FIGURE 16

TABLE 12. — *Annual allowable cut for hardwood species on Crown land.*

Species	Annual allowable cut cu. ft.
White birch.....	29,139,955
Poplar.....	69,972,055
Other hardwoods.....	108,340
<b>TOTAL HARDWOODS.....</b>	<b>99,220,350</b>

cent is coniferous species and 99,220,350 cubic feet or 47 per cent is of hardwood species. Since the rotation age is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.5 per cent of the coniferous primary

TABLE 13. — *Annual allowable cut for all species on patented land.*

Species	Annual allowable cut cu. ft.
White pine.....	288,300
Red pine.....	97,300
Jack pine.....	1,884,100
White spruce.....	763,600
Black spruce.....	1,288,900
Balsam fir.....	1,428,700
White cedar.....	160,800
Larch.....	17,700
<b>TOTAL CONIFERS.....</b>	<b>5,929,400</b>
White birch.....	4,225,400
Poplar (all).....	12,874,900
Other hardwoods.....	82,200
<b>TOTAL HARDWOODS.....</b>	<b>17,182,500</b>

growing stock and 2.5 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 47

per cent is white and black spruce, 32 per cent jack pine, 18 per cent balsam and 3 per cent of other conifers. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock for conifers by species is shown graphically, figure 16.

The species making up the hardwood content (table 12) show that 71 per cent is poplar and 29 per cent is white birch, whereas other hardwoods are in inappreciable quantities. The relationship of the

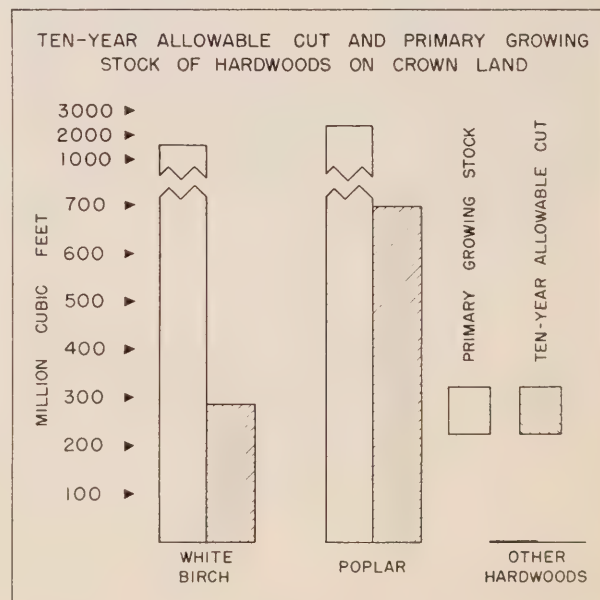


FIGURE 17



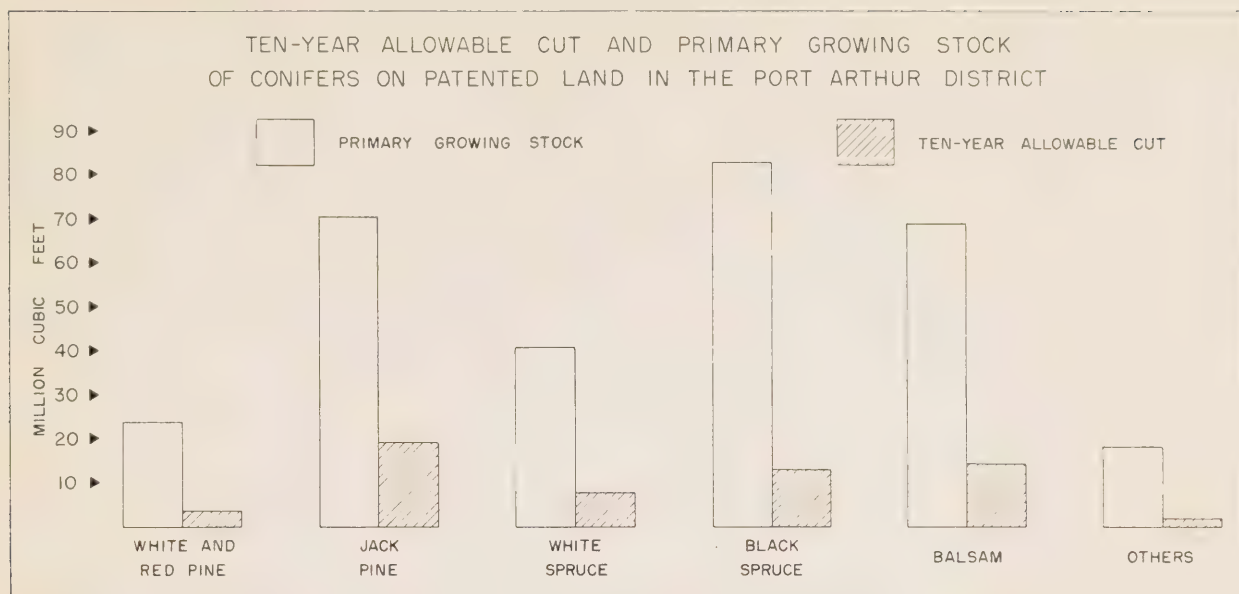


FIGURE 18

allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 17.

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 23,111,900 cubic feet, which represents 2.8 per cent of the primary growing stock or 34.6 cubic feet per acre of the productive forest land. The annual allowable cut on patented lands is 2.0 per cent

of the coniferous primary growing stock and 3.3 per cent for the hardwoods.

The annual allowable cut for coniferous species on patented lands is 5,929,400 cubic feet and for hardwoods, 17,182,500 cubic feet. Almost three-quarters of the total allowable cut is for the two intolerant hardwood species, poplar and white birch, which together contribute more than 17 million cubic feet to the total allowable cut (table 13). For the coniferous species black and white spruce contribute approximately two million cubic feet, jack pine is next in importance with 1.9 million cubic feet, followed by balsam with 1.4 million cubic feet. White and red pine, white cedar and larch are present in inappreciable amounts (figs. 18 and 19).

#### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Returns<sup>1</sup> for the period 1946-1949 inclusive, the average annual amounts of wood and forest products were cut on Crown lands in the Port Arthur district as follows:

Pulpwood.....	566,425 cords
Logs and booms.....	33,460,956 F.B.M. Doyle rule
Poles.....	33,890 pieces
Ties.....	17,442 pieces
Posts.....	1,036 pieces
Piling.....	622 pieces
Logging.....	26,664 lineal feet
Fuelwood.....	3,955 cords

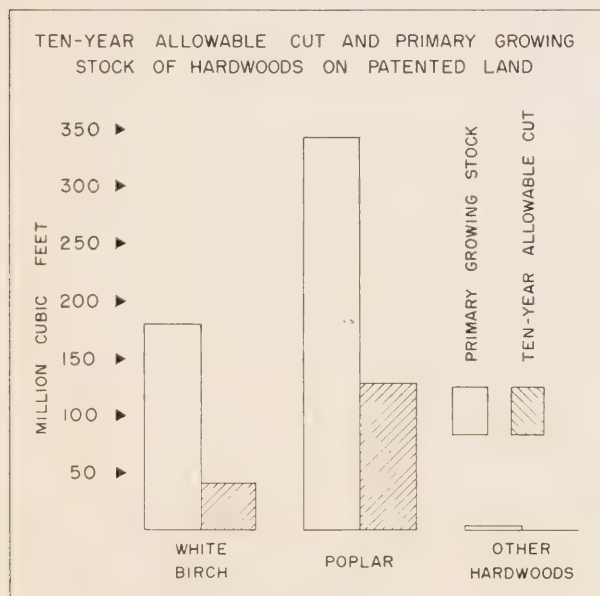


FIGURE 19

<sup>1</sup> Reports of the Minister of Lands and Forests, for the Province of Ontario, for the fiscal years ending March 31, 1947-1950.



By the use of appropriate converting factors these amounts are expressed in gross total cubic feet (table 14) and are comparable with the figures for allowable cut (table 15).

TABLE 14. — *Gross total cubic volume of wood utilized annually in the Port Arthur district.*

Species	Wood utilized <i>cu. ft.</i>	Total <i>per cent</i>
Pine, white and red.....	1,233,850	1
Jack pine.....	18,417,887	23
Spruce, white and black.....	49,629,479	62
Balsam fir.....	7,554,903	9
White cedar.....	23,875	
Larch.....	90	
<b>TOTAL CONIFERS.....</b>	<b>76,860,084</b>	<b>95</b>
White birch.....	157,415	....
Poplar.....	3,470,302	5
Other hardwoods.....	135	
<b>TOTAL HARDWOODS.....</b>	<b>3,627,852</b>	<b>5</b>
<b>TOTAL.....</b>	<b>80,487,936</b>	

A comparison of the annual allowable cut with the actually cut volume by species (table 15) indicates that only the utilization of spruce has reached the allowable cut level, and that utilization of other species was considerably less than the allowable cut permits (fig. 20).

The hardwood species were scarcely utilized in

the Port Arthur district, with only 3,628 thousand cubic feet used out of a total allowable cut of 99,220 thousand cubic feet (table 15). While the cut of conifers was 70 per cent of their allowable cut, only 4 per cent of the allowable cut for hardwood species was utilized. Excessive volumes of poplar and white birch remain unutilized on Crown land in the Port Arthur district (figure 20).

There are no available records of the quantity of timber utilized from patented lands in the Port Arthur district.

TABLE 15. — *Comparison of allowable cut with actual utilization by species.*

Species	Allowable cut <i>Thousand cu. ft.</i>	Actual cut <i>Thousand cu. ft.</i>
Pine, white and red.....	2,319	1,234
Jack pine.....	35,409	18,418
Spruce.....	52,287	49,629
Balsam fir.....	19,497	7,555
White cedar.....	722	24
Larch.....	60	..
<b>TOTAL CONIFERS.....</b>	<b>110,294</b>	<b>76,860</b>
White birch.....	29,140	158
Poplar.....	69,972	3,470
Other hardwoods.....	108	.....
<b>TOTAL HARDWOODS.....</b>	<b>99,220</b>	<b>3,628</b>
<b>TOTAL.....</b>	<b>209,514</b>	<b>80,488</b>

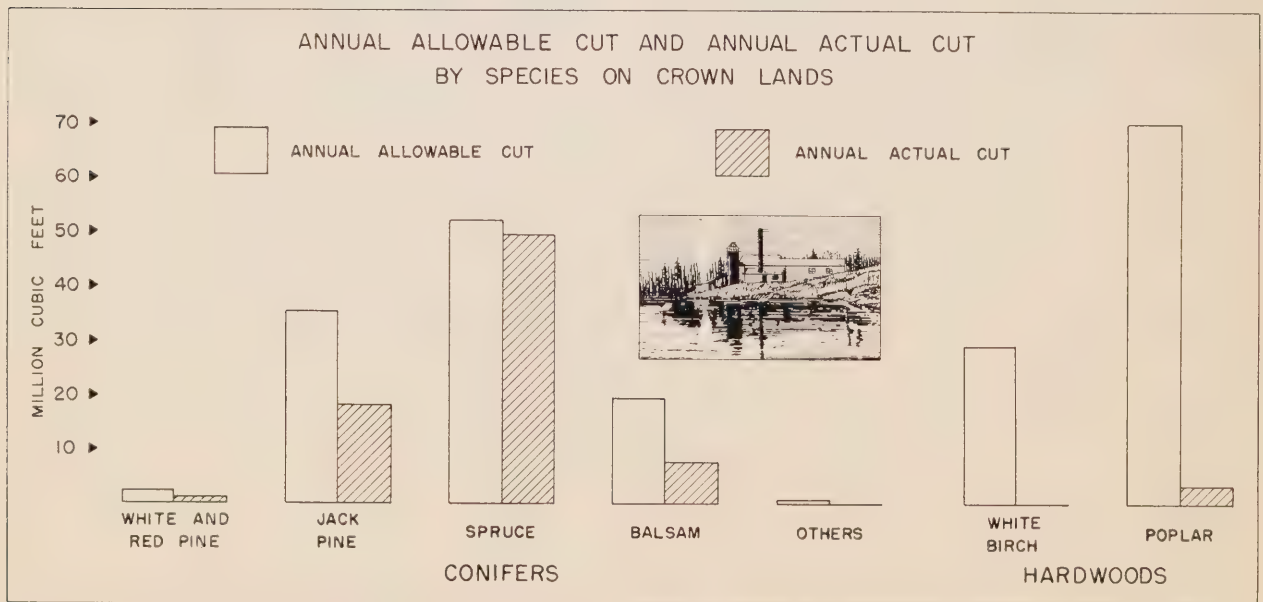


FIGURE 20

# APPENDIX

## Survey Methods

● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15840). Following the photography, planimetric base maps were prepared by the Slotted Template Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Systematic sampling was carried out by field crews who collected all the data necessary for the making of the volume estimates. On the completion of the field work finished forest type maps were prepared and areas determined by the usual methods.<sup>1</sup>

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood, and mixedwoods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density

classes. These summaries were made separately for the four regions or ecological sections in the Port Arthur district. The per acre volumes in cubic feet, made up in this manner, are shown in tables 18, 19, 20 and 21.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the Port Arthur district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Port Arthur district are shown in figure 21.

## Mean Annual Increment

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to approximately 29 cubic feet per acre, and for patented land, 33 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

## Age Classes

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range from 10 to 100 years, the mature age class from 30 to 200 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

TABLE 16. — *Rotation by species.*

Species	Crown and patented lands years
White pine.....	120
Red pine.....	100
Jack pine.....	70
White spruce.....	160
Black spruce.....	120
Balsam fir.....	90
Whitecedar.....	200
Larch.....	160
White birch.....	80
Poplar.....	50
Red maple.....	70
Ash.....	160

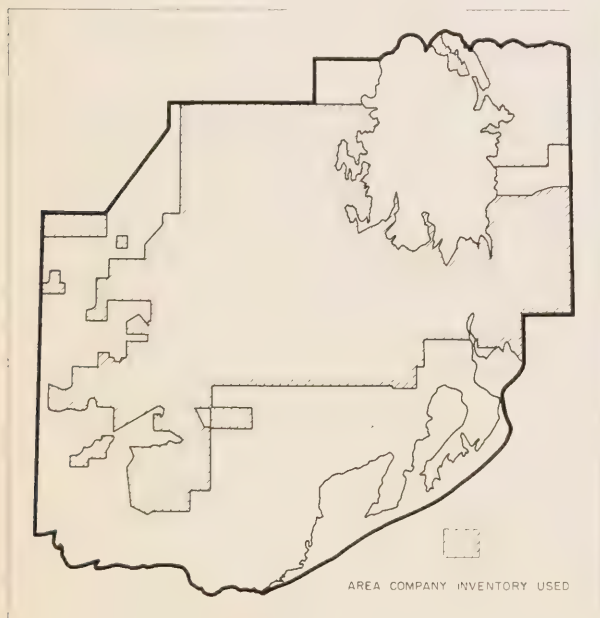


FIGURE 21

<sup>1</sup> A complete statement of the methods used in the inventory will be found in Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

## Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class Ib<sup>1</sup> were used as rotation ages for all species encountered, with the exception of jack pine, for which a rotation of seventy years instead of sixty has been adopted (table 16).

In calculations of allowable cut the same rotation ages for Crown as for patented lands were used.

## Allowable Cut

### (a) METHOD

The following two bases were available for calculation of allowable cut: 1. the volume of the mature and immature age classes for each species, and 2. the adopted rotation ages.

The compilation was carried out in such a way that the volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>2</sup> was considered and found to be satisfactory, for the following reasons: 1. The ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 required by the French method; 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same; 3. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

### (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I)
- V.2. — denotes volume of immature timber (Age Class II)
- n — denotes rotation
- P — denotes annual allowable cut

<sup>1</sup> Manual of Timber Management, Department of Lands and Forests, Ontario — Part II, page 50.

<sup>2</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.

By application of this formula the following figures for the annual allowable cut were obtained:

Crown lands...	272,096,500 cu. ft.
Patented lands.	23,111,900 cu. ft.
<b>TOTAL</b>	<b>295,208,400 cu. ft.</b>

which may be regarded as the maximum annual allowable cut for the district. The result remains unchanged as regards patented lands, which appear only on about 8 per cent of the area. On Crown lands, however, it would be justified only if need of intensive all-over utilization were substantiated by the present operations in the district. As may be seen from table 14, the actually utilized annual volume was only 80,487,936 cubic feet on Crown land, or 30 per cent of 272,096,500 cubic feet of the maximum annual allowable cut in the Port Arthur district.

With rather a moderate yet steady demand on wood in view, with the exception of demand on spruce, and with considerable accumulation of mature timber in the district, an advantageous opportunity arises, where by means of a reduced, and not the maximum utilization the normal size of age classes may be obtained, thus a sound foundation would be created for a balanced sustained yield in the future.

During the period of a gradual, and not radical, normalization of age class areas, a portion of mature and overmature stands will be held over and above their mature age. This involves certain losses in volume of those stands where increasing cull may not be balanced by volume increment of ageing stands.



An example of a selectively marked area after cutting. Note spacing of trees, their form and lopped brush under 2 feet high.



These losses, however, are not expected to be of great importance, inasmuch as one-third of all primary growing stock is made of spruce hardly given to decay.

In view of the foregoing, the calculations of the annual allowable cut, carried out on the French method principles, were brought to a lower level, according to the following procedure.

If the average volumes per acre of the mature and immature stands are compared, then it can be seen that the relation is:

$$\frac{V.1 \quad 2,339.87 \quad 3.85}{V.2 \quad 1,821.90 \quad 3} = \frac{5}{3} \text{ and not } \frac{5}{3} \text{ as required.}$$

This results from the mature stands being cut over and partially damaged by insects in the past with considerable reduction of volume per acre in effect. This difference between the actual and that desirable volume per acre of mature stands amounts to approximately 23 per cent. Thus, to build up the present growing stock without reaching into immature stands, the maximum allowable cut, calculated with the aid of the French method, was reduced by 23 per cent for Crown lands and brought down to 209,514,305 cubic feet, and assessed as the annual allowable cut on Crown lands in the Port Arthur district.

As a check on the above figure, the allowable cut was calculated also by the Area Allotment method, with the following result:

Productive forest area 7,241,554 acres.  
 Age Class I volume per acre 2,339.87 cubic feet.  
 Mean annual increment to the rotation age 28.87 cubic feet.  
 2,339.87  
 Thus the average rotation ----- = 81 years.  
 28.87  
 Normal area allotment =  $7,241,554 \div 81 = 89,402$  acres.  
 Normal annual allowable cut =  $89,402 \times 2,339.87 = 209,189,060$  cu. ft.

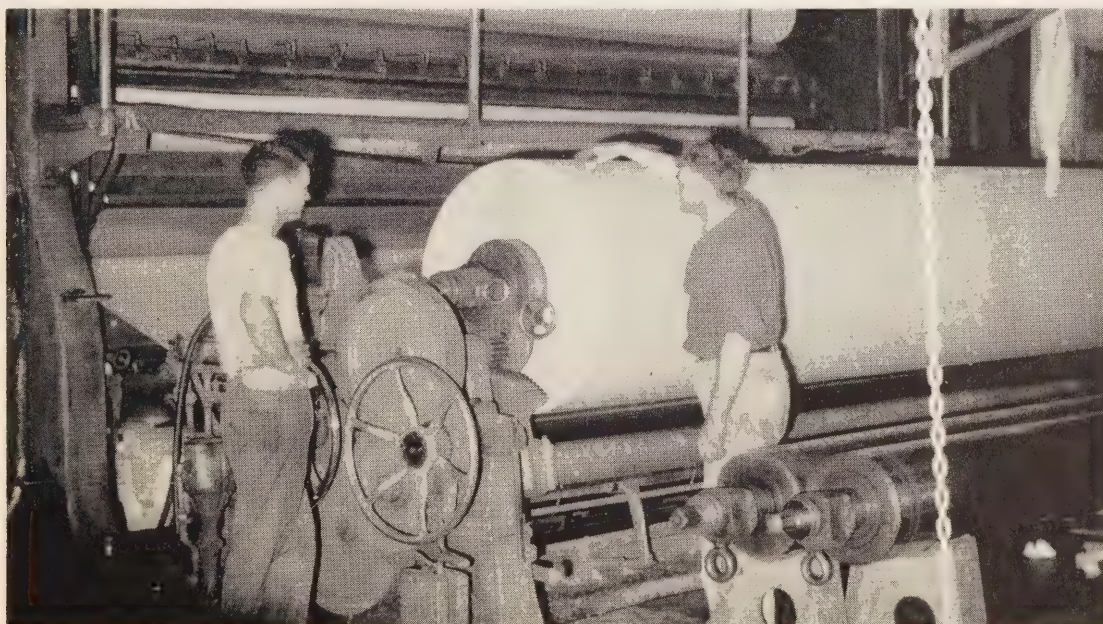
This, compared with the allowable cut assessed in the amount of 209,514,305 cubic feet, indicates that the reduced allowable cut for Crown lands in the Port Arthur district has been brought to an almost normal level.

### Cull Factor

Where it was found necessary either to calculate net merchantable volumes or to calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, the appropriate cull factors (table 17) were used throughout. These cull factors were taken from the figures for defects made available from operations being carried out in the district.

TABLE 17. — *Cull factors by species, the Port Arthur district.*

Species	Cull per cent
Pine, white and red.....	30
Jack pine.....	13
Spruce, white and black.....	8
Balsam fir.....	32
White cedar.....	30
Larch.....	30
White birch.....	20
Poplar.....	43
Ash.....	30



*Paper for countless uses is processed at the Lakehead.*



TABLE 18. — *Volume of the primary growing stock in cubic feet per acre*  
*Western Transition Section — 1950*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	525.0	495.3	386.6	208.2	896.1	817.7	573.5	215.0
	10'' up	364.8	344.2	268.7	134.3	111.9	102.1	71.6	26.9
White spruce.....	4''-9''	21.0	19.8	15.4	13.2	14.9	13.6	9.5	3.5
	10'' up	58.7	55.4	43.3	41.2	9.1	8.3	5.9	2.2
Black spruce.....	4''-9''	978.9	923.7	720.9	116.9	679.3	619.9	434.8	163.0
	10'' up	197.7	186.5	145.6	.....	52.7	48.1	33.7	12.7
Balsam fir.....	4''-9''	164.8	155.5	121.3	59.1	49.4	45.1	31.6	11.8
	10'' up	50.3	47.5	37.1	7.0	8.6	7.8	5.5	2.1
White cedar.....	4''-9''	6.8	6.4	5.0	32.5	.....	.....	.....	.....
	10'' up	3.8	3.6	2.8	107.0	.....	.....	.....	.....
Larch.....	4''-9''	.....	.....	.....	.....	3.3	3.0	2.1	0.8
	10'' up	.....	.....	.....	.....	0.7	0.6	0.4	0.2
TOTAL CONIFERS.....	4''-9''	1696.5	1600.7	1249.2	429.9	1643.0	1499.3	1051.5	394.1
	10'' up	675.3	637.2	497.5	289.5	183.0	166.9	117.1	44.1
White birch.....	4''-9''	80.9	76.3	59.6	45.5	52.8	48.2	33.8	12.7
	10'' up	67.8	64.9	49.9	32.4	9.2	8.4	5.9	2.2
Poplar (all).....	4''-9''	44.6	42.0	32.8	30.1	81.4	74.3	52.1	19.6
	10'' up	90.9	85.8	67.0	78.6	30.6	27.9	19.6	7.3
TOTAL HARDWOODS.....	4''-9''	125.5	118.3	92.4	75.6	134.2	122.5	85.9	32.3
	10'' up	158.7	149.8	116.9	111.0	39.8	36.3	25.5	9.5
GRAND TOTAL.....	4''-9''	1822.0	1719.0	1341.6	505.5	1777.2	1621.8	1137.4	426.4
	10'' up	834.0	787.0	614.4	400.5	222.8	203.2	142.6	53.6
TOTAL 4'' UP.....		2656.0	2506.0	1956.0	906.0	2000.0	1825.0	1280.0	480.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	39.9	36.4	25.8	14.3	71.2	60.8	38.9	30.0
	10'' up	65.0	59.5	42.2	21.6	32.3	27.6	17.6	68.2
White spruce.....	4''-9''	12.8	11.7	8.3	1.5	7.0	6.0	3.9	.....
	10'' up	26.2	23.9	17.0	.....	4.5	3.8	2.4	.....
Black spruce.....	4''-9''	41.7	38.1	27.0	.....	37.5	32.0	20.5	1.7
	10'' up	6.3	5.7	4.1	.....	2.8	2.4	1.5	.....
Balsam fir.....	4''-9''	23.4	21.3	15.2	14.2	36.9	31.5	20.1	.....
	10'' up	18.6	17.0	12.0	.....	1.4	1.2	0.8	.....
TOTAL CONIFERS.....	4''-9''	117.8	107.5	76.3	30.0	152.6	130.3	83.4	31.7
	10'' up	116.1	106.1	75.3	21.6	41.0	35.0	22.3	68.2
White birch.....	4''-9''	369.5	337.6	239.4	81.5	322.4	275.3	176.1	215.9
	10'' up	119.2	108.9	77.3	.....	13.1	11.2	7.1	.....
Poplar (all).....	4''-9''	1114.9	1018.7	722.6	177.7	1215.8	1038.2	664.1	31.2
	10'' up	1160.5	1060.2	752.1	437.2	172.1	147.0	94.0	.....
TOTAL HARDWOODS.....	4''-9''	1484.4	1356.3	962.0	258.6	1538.2	1313.5	840.2	247.1
	10'' up	1279.7	1169.1	829.4	437.8	185.2	158.2	101.1	.....
GRAND TOTAL.....	4''-9''	1602.2	1463.8	1038.3	288.6	1690.8	1443.8	923.6	278.8
	10'' up	1395.8	1275.2	904.7	459.4	226.2	193.2	123.4	68.2
TOTAL 4'' UP.....		2998.0	2739.0	1943.0	748.0	1917.0	1637.0	1047.0	347.0

TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	214.3	198.7	144.4	.....	456.6	420.3	301.9	98.6
	10'' up	299.7	277.7	202.0	.....	137.1	126.2	90.7	58.7
White spruce.....	4''-9''	67.8	62.8	45.7	.....	42.7	39.3	28.2	40.4
	10'' up	139.6	129.4	94.1	110.4	14.5	13.3	9.6	.....
Black spruce.....	4''-9''	288.7	267.6	194.6	.....	337.0	310.3	222.9	54.0
	10'' up	123.1	114.1	83.0	59.6	34.6	31.8	22.9	64.6
Balsam fir.....	4''-9''	251.1	232.8	169.3	158.0	92.8	85.4	61.3	22.2
	10'' up	103.6	96.0	69.8	69.3	15.0	13.8	9.9	.....
White cedar.....	4''-9''	.....	.....	.....	78.2	.....	.....	.....	2.2
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
Larch.....	4''-9''	.....	.....	.....	.....	4.4	4.0	2.9	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	821.9	761.9	554.0	236.2	933.5	859.3	617.2	217.4
	10'' up	665.0	617.2	448.9	239.3	201.2	185.1	133.1	123.3
White birch.....	4''-9''	320.3	296.9	215.9	223.2	283.0	260.6	187.1	57.7
	10'' up	256.9	238.0	173.1	42.8	44.6	41.0	29.5	24.8
Poplar (all).....	4''-9''	362.2	335.7	244.1	.....	544.4	501.0	360.0	89.1
	10'' up	578.7	536.3	390.0	64.5	192.3	177.0	127.1	10.1
Ash.....	4''-9''	.....	.....	.....	.....	.....	.....	.....	16.9
	10'' up	.....	.....	.....	.....	.....	.....	.....	14.7
TOTAL HARDWOODS.....	4''-9''	682.5	632.6	460.0	223.2	827.4	761.6	547.1	163.7
	10'' up	835.6	774.3	563.1	107.3	236.9	218.0	156.6	49.6
GRAND TOTAL.....	4''-9''	1504.4	1394.5	1014.0	459.4	1760.9	1620.9	1164.3	381.1
	10'' up	1501.6	1391.5	1012.0	346.6	438.1	403.1	289.7	172.9
TOTAL 4'' UP.....		3006.0	2786.0	2026.0	806.0	2199.0	2024.0	1454.0	554.0



A forest plantation.

TABLE 19. — *Volume of the primary growing stock in cubic feet per acre*  
*Central Plateau Section — 1949*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	155.4	151.8	132.7	42.9	613.3	596.8	509.5	33.3
	10'' up	211.2	206.2	180.3	28.5	73.5	71.5	61.0	.....
White spruce.....	4''-9''	17.0	16.6	14.5	.....	5.9	5.7	4.9	1.6
	10'' up	141.6	138.3	120.9	44.5	14.5	14.1	12.0	.....
Black spruce.....	4''-9''	1224.1	1195.4	1045.3	595.4	979.9	953.4	814.0	534.9
	10'' up	257.9	251.8	220.2	178.8	73.8	71.8	61.3	44.0
Balsam fir.....	4''-9''	191.7	187.2	163.7	51.2	53.2	51.8	44.2	35.8
	10'' up	55.3	54.0	47.2	3.7	7.9	7.7	6.6	.....
White cedar.....	4''-9''	39.5	38.6	33.8	10.3	.....	.....	.....	57.1
	10'' up	38.5	37.6	32.8	.....	.....	.....	.....	60.0
Larch.....	4''-9''	.....	.....	.....	.....	12.2	11.9	10.2	15.4
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	1627.7	1589.6	1390.0	699.8	1664.5	1619.6	1382.8	678.1
	10'' up	704.5	687.9	601.4	255.5	169.7	165.1	140.9	104.0
White birch.....	4''-9''	66.4	64.9	56.7	15.8	75.9	73.9	63.0	14.6
	10'' up	66.2	64.6	56.5	18.4	13.8	13.4	11.5	.....
Poplar (all).....	4''-9''	31.2	30.5	26.7	9.2	85.8	83.5	71.3	16.3
	10'' up	104.0	101.5	88.7	36.3	28.3	27.5	23.5	.....
TOTAL HARDWOODS.....	4''-9''	97.6	95.4	83.4	25.0	161.7	157.4	134.3	30.9
	10'' up	170.2	166.1	145.2	54.7	42.1	40.9	35.0	.....
GRAND TOTAL.....	4''-9''	1725.3	1685.0	1473.4	724.8	1826.2	1777.0	1517.1	709.0
	10'' up	874.7	854.0	746.6	310.2	211.8	206.0	175.9	104.0
TOTAL 4'' UP.....		2600.0	2539.0	2220.0	1035.0	2038.0	1983.0	1693.0	813.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9''	4.5	4.1	3.2	1.3	85.6	77.5	56.5	21.7
	10'' up	57.4	53.5	41.6	17.3	45.1	40.8	29.8	11.5
White spruce.....	4''-9''	34.6	32.2	25.0	10.4	11.1	10.1	7.3	2.8
	10'' up	31.4	29.3	22.8	9.5	20.2	18.2	13.3	5.1
Black spruce.....	4''-9''	99.6	92.7	72.0	30.0	84.4	76.4	55.8	21.4
	10'' up	7.7	7.2	5.6	2.3	3.7	3.3	2.4	0.9
Balsam fir.....	4''-9''	56.8	52.9	41.2	17.1	22.7	20.5	15.0	5.8
	10'' up	42.2	39.3	30.5	12.7	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	195.5	181.9	141.4	58.8	203.8	184.5	134.6	51.7
	10'' up	138.7	129.3	100.5	41.8	69.0	62.3	45.5	17.5
White birch.....	4''-9''	671.0	624.6	485.6	201.8	408.1	369.3	269.5	103.6
	10'' up	298.6	278.0	216.1	89.8	23.7	21.5	15.7	6.0
Poplar (all).....	4''-9''	1408.3	1311.0	1019.2	423.6	1873.6	1695.6	1237.2	475.5
	10'' up	1413.9	1316.2	1023.2	425.2	262.8	237.8	173.5	66.7
TOTAL HARDWOODS.....	4''-9''	2079.3	1935.6	1504.8	625.4	2281.7	2064.9	1506.7	579.1
	10'' up	1712.5	1594.2	1239.3	515.0	286.5	259.3	189.2	72.7
GRAND TOTAL.....	4''-9''	2274.8	2117.5	1646.2	684.2	2485.5	2249.4	1641.3	630.8
	10'' up	1851.2	1723.5	1339.8	556.8	355.5	321.6	234.7	90.2
TOTAL 4'' UP.....		4126.0	3841.0	2986.0	1241.0	2841.0	2571.0	1876.0	721.0



TABLE 19 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	158.1	154.1	130.0	214.1	360.0	340.5	269.1	122.3
	10'' up	350.2	341.5	288.1	.....	97.4	92.1	72.8	33.1
White spruce.....	4''-9''	81.4	79.4	67.0	9.4	14.4	13.6	10.8	4.9
	10'' up	243.0	236.9	199.8	338.1	32.7	31.0	24.4	11.1
Black spruce.....	4''-9''	366.3	357.1	301.2	121.2	493.5	466.8	368.9	167.7
	10'' up	203.3	198.3	167.3	151.2	69.2	65.5	51.7	23.5
Balsam fir.....	4''-9''	199.4	194.4	164.0	18.1	71.6	67.7	53.5	24.4
	10'' up	56.6	55.2	46.5	.....	31.0	29.3	23.2	10.5
Larch.....	4''-9''	.....	.....	.....	.....	7.5	7.1	5.6	2.5
	10'' up	.....	.....	.....	.....	0.8	0.8	0.6	0.3
TOTAL CONIFERS.....	4''-9''	805.2	785.0	662.2	362.8	947.0	895.7	707.9	321.8
	10'' up	853.1	831.9	701.7	489.3	231.1	218.7	172.7	78.5
White birch.....	4''-9''	453.0	441.7	372.6	98.7	381.9	361.2	285.4	129.8
	10'' up	278.8	271.8	229.3	.....	72.7	68.8	54.4	24.7
Poplar (all).....	4''-9''	388.8	379.1	319.7	410.2	902.3	853.5	674.5	306.7
	10'' up	826.1	805.5	679.5	29.0	237.0	224.1	177.1	80.5
TOTAL HARDWOODS.....	4''-9''	841.8	820.8	692.3	508.9	1284.2	1214.7	959.9	436.5
	10'' up	1104.9	1077.3	908.8	29.0	309.7	292.9	231.5	105.2
GRAND TOTAL.....	4''-9''	1647.0	1605.8	1354.5	871.7	2231.2	2110.4	1667.8	758.3
	10'' up	1958.0	1909.2	1610.5	518.3	540.8	511.6	404.2	183.7
TOTAL 4'' UP.....		3605.0	3515.0	2965.0	1390.0	2772.0	2622.0	2072.0	942.0



A general view of two skidways of logs and one of poles with the residual stand in the background. Note the presence of thrifty white pine.



TABLE 20. — *Volume of the primary growing stock in cubic feet per acre*  
*Superior Section — 1949*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	178.6	168.8	133.1	.....	290.2	275.4	215.5	.....
	10'' up	121.0	114.4	90.3	.....	84.8	80.4	62.9	.....
White spruce.....	4''-9''	56.1	53.0	41.8	.....	75.1	71.2	55.7	12.9
	10'' up	140.6	133.0	104.8	.....	45.6	43.3	33.9	.....
Black spruce.....	4''-9''	592.1	559.8	441.4	13.0	751.1	712.7	557.6	.....
	10'' up	267.3	252.7	199.3	.....	74.3	70.5	55.2	.....
Balsam fir.....	4''-9''	615.7	582.2	459.1	366.7	298.0	282.8	221.3	542.5
	10'' up	155.9	147.4	116.2	.....	33.9	32.1	25.1	.....
White cedar.....	4''-9''	130.5	123.4	97.3	68.1	132.2	125.5	98.2	.....
	10'' up	144.9	136.9	108.0	30.0	79.0	74.9	58.6	.....
Larch.....	4''-9''	.....	.....	.....	.....	25.8	24.6	19.2	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	1573.0	1487.2	1172.7	447.8	1572.4	1492.2	1167.5	555.4
	10'' up	829.7	784.4	618.6	30.0	317.6	301.2	235.7	.....
White birch.....	4''-9''	170.2	160.9	126.9	19.3	69.5	66.0	51.6	63.2
	10'' up	350.2	331.2	261.1	428.9	81.3	77.2	60.4	.....
Poplar (all).....	4''-9''	34.8	32.9	25.9	.....	77.0	73.1	57.2	26.4
	10'' up	68.1	64.4	50.8	.....	37.2	35.3	27.6	.....
TOTAL HARDWOODS.....	4''-9''	205.0	193.8	152.8	19.3	146.5	139.1	108.8	89.6
	10'' up	418.3	395.6	311.9	428.9	118.5	112.5	88.0	.....
GRAND TOTAL.....	4''-9''	1778.0	1681.0	1325.5	467.1	1718.9	1631.3	1276.3	645.0
	10'' up	1248.0	1180.0	930.5	458.9	436.1	413.7	323.7	.....
TOTAL 4'' UP.....		3026.0	2861.0	2256.0	926.0	2155.0	2045.0	1600.0	645.0

SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	.....	.....	.....	.....	2.7	2.6	2.0	.....
	10'' up	.....	.....	.....	30.3	22.0	20.9	16.0	.....
White spruce.....	4''-9''	39.0	38.5	33.5	.....	37.6	35.9	27.5	.....
	10'' up	47.0	46.3	40.3	24.0	24.0	22.9	17.6	.....
Black spruce.....	4''-9''	22.0	21.7	18.9	20.2	30.5	29.1	22.4	20.2
	10'' up	7.6	7.5	6.6	.....	4.0	3.8	2.9	.....
Balsam fir.....	4''-9''	31.0	30.6	26.6	27.7	45.3	43.2	33.1	.....
	10'' up	16.4	16.2	14.1	.....	16.3	15.6	12.0	.....
White cedar.....	4''-9''	.....	.....	.....	14.3	3.2	3.1	2.4	.....
	10'' up	.....	.....	.....	26.0	1.7	1.6	1.2	.....
Larch.....	4''-9''	.....	.....	.....	.....	.....	.....	.....	23.2
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	92.0	90.8	79.0	62.2	119.3	113.9	87.4	43.4
	10'' up	71.0	70.0	61.0	80.3	68.0	64.8	49.7	.....
White birch.....	4''-9''	608.8	600.6	522.5	387.7	709.0	675.6	519.0	17.3
	10'' up	274.8	271.1	235.9	121.7	203.5	193.9	148.9	.....
Poplar (all).....	4''-9''	1024.4	1010.6	879.3	414.2	923.6	880.0	676.0	544.5
	10'' up	894.0	881.9	767.3	194.9	442.6	421.8	324.0	144.8
TOTAL HARDWOODS.....	4''-9''	1633.2	1611.2	1401.8	801.9	1632.6	1555.6	1195.0	561.8
	10'' up	1168.8	1153.0	1003.2	316.6	646.1	615.7	472.9	144.8
GRAND TOTAL.....	4''-9''	1725.2	1702.0	1480.8	864.1	1751.9	1669.5	1282.4	605.2
	10'' up	1239.8	1223.0	1064.2	396.9	714.1	680.5	522.6	144.8
TOTAL 4'' UP.....		2965.0	2925.0	2545.0	1261.0	2466.0	2350.0	1805.0	750.0

TABLE 20 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine .....	4''-9''	66.3	63.7	53.5	.....	38.3	36.6	29.1	.....
	10'' up	96.7	92.8	78.0	.....	25.8	24.6	19.5	.....
White spruce .....	4''-9''	167.4	160.8	135.1	25.4	155.6	148.5	118.2	35.3
	10'' up	240.0	230.4	193.7	17.8	93.0	88.8	70.6	.....
Black spruce .....	4''-9''	261.1	250.7	210.8	45.8	357.6	341.3	271.6	31.9
	10'' up	75.0	72.0	60.5	.....	34.5	32.9	26.2	.....
Balsam fir .....	4''-9''	351.8	337.8	283.9	217.1	211.3	201.7	160.5	49.1
	10'' up	96.3	92.5	77.8	41.0	37.3	35.6	28.3	.....
White cedar .....	4''-9''	16.2	15.5	13.1	78.4	34.9	33.3	26.4	12.9
	10'' up	31.3	30.1	25.3	141.7	29.2	27.9	22.2	.....
Larch .....	4''-9''	.....	.....	.....	.....	7.7	7.3	5.8	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS .....	4''-9''	862.8	828.5	696.4	366.7	805.4	768.7	611.6	129.2
	10'' up	539.3	517.8	435.3	200.5	219.8	209.8	166.8	.....
White birch .....	4''-9''	595.9	572.2	480.9	64.8	679.7	648.6	516.0	238.4
	10'' up	453.2	435.2	365.7	655.7	230.2	219.7	174.8	72.4
Poplar (all) .....	4''-9''	319.0	306.3	257.5	22.3	425.1	405.7	322.8	257.2
	10'' up	624.8	600.0	504.2	.....	202.8	193.5	154.0	163.8
TOTAL HARDWOODS .....	4''-9''	914.9	878.5	738.4	87.1	1104.8	1054.3	838.8	495.6
	10'' up	1078.0	1035.2	869.9	655.7	433.0	413.2	328.8	236.2
GRAND TOTAL .....	4''-9''	1777.7	1707.0	1434.8	453.8	1910.2	1823.0	1450.4	624.8
	10'' up	1617.3	1553.0	1305.2	856.2	652.8	623.0	495.6	236.2
TOTAL 4'' UP .....		3395.0	3260.0	2740.0	1310.0	2563.0	2446.0	1945.0	861.0



TABLE 21. — *Volume of the primary growing stock in cubic feet per acre*  
*Quetico Section — 1950*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	8.9	8.7	7.5	12.4	22.5	21.8	19.0	2.5
	10'' up	225.4	220.6	189.1	269.7	64.5	62.4	54.5	167.3
Red pine.....	4''-9''	23.7	23.2	19.9	1.9	41.8	40.5	35.3	3.8
	10'' up	177.5	173.7	148.9	35.0	69.5	67.2	58.6	11.4
Jack pine.....	4''-9''	544.3	532.6	456.7	116.0	552.3	534.6	466.3	24.1
	10'' up	265.6	259.9	222.9	76.7	135.5	131.1	114.4	24.4
White spruce.....	4''-9''	16.9	16.5	14.2	7.2	22.8	22.0	19.2	11.8
	10'' up	44.2	43.3	37.1	26.9	29.8	28.9	25.2	48.8
Black spruce.....	4''-9''	496.4	485.6	416.5	59.9	526.1	509.2	444.2	26.8
	10'' up	94.5	92.5	79.3	13.9	56.5	54.7	47.7	23.2
Balsam fir.....	4''-9''	116.8	114.2	98.0	67.5	111.7	108.2	94.4	81.1
	10'' up	33.5	32.8	28.1	39.5	13.7	13.2	11.5	.....
White cedar.....	4''-9''	63.3	61.9	53.1	13.4	32.3	31.2	27.2	30.3
	10'' up	87.0	85.1	73.0	49.3	26.4	25.6	22.3	79.6
TOTAL CONIFERS.....	4''-9''	1270.3	1242.7	1065.9	278.3	1309.5	1267.5	1105.6	180.4
	10'' up	927.7	907.9	778.4	511.0	395.9	383.1	334.2	354.7
White birch.....	4''-9''	64.2	62.8	53.8	16.7	50.0	48.4	42.2	33.3
	10'' up	63.2	61.8	53.0	39.5	20.8	20.1	17.6	23.6
Poplar (all).....	4''-9''	90.9	88.9	76.2	34.5	130.6	126.4	110.2	0.3
	10'' up	130.7	127.9	109.7	41.1	116.2	112.5	98.2	165.7
Red maple.....	4''-9''	.....	.....	.....	0.9	.....	.....	.....	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4''-9''	155.1	151.7	130.0	52.1	180.6	174.8	152.4	33.6
	10'' up	193.9	189.7	162.7	80.6	137.0	132.6	115.8	189.3
GRAND TOTAL.....	4''-9''	1425.4	1394.4	1195.9	330.4	1490.1	1442.3	1258.0	214.0
	10'' up	1121.6	1097.6	941.1	591.6	532.9	515.7	450.0	544.0
TOTAL 4'' UP.....		2547.0	2492.0	2137.0	922.0	2023.0	1958.0	1708.0	758.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-I)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	9.0	8.5	6.9	.....	1.2	1.1	0.8	.....
	10'' up	24.0	22.6	18.3	284.1	29.1	26.6	19.4	.....
Jack pine.....	4''-9''	15.8	14.9	12.1	1.1	86.1	78.9	57.6	29.0
	10'' up	44.6	42.0	34.2	3.3	42.4	38.8	28.4	19.0
White spruce.....	4''-9''	13.1	12.4	10.0	10.6	5.7	5.2	3.8	2.2
	10'' up	28.1	26.4	21.5	35.5	15.1	13.8	10.1	4.9
Black spruce.....	4''-9''	18.9	17.7	14.4	1.1	17.0	15.6	11.4	1.0
	10'' up	3.1	3.0	2.4	.....	3.8	3.4	2.5	.....
Balsam fir.....	4''-9''	35.0	32.9	26.8	5.8	37.0	33.9	24.8	4.6
	10'' up	22.7	21.4	17.4	13.9	14.0	12.8	9.4	.....
White cedar.....	4''-9''	.....	.....	.....	.....	.....	.....	.....	.....
	10'' up	.....	.....	.....	.....	.....	.....	.....	7.1
TOTAL CONIFERS.....	4''-9''	91.8	86.4	70.2	18.6	147.0	134.7	98.4	36.8
	10'' up	122.5	115.4	93.8	336.8	104.4	95.4	69.8	31.0
White birch.....	4''-9''	390.9	368.2	299.1	44.5	236.0	216.1	158.0	22.4
	10'' up	166.7	157.0	127.6	117.9	13.5	12.3	9.0	.....
Poplar (all).....	4''-9''	766.2	721.5	586.3	153.5	1232.5	1128.2	824.9	382.9
	10'' up	1154.0	1086.8	883.0	425.7	141.5	129.5	94.7	33.8
Soft maple.....	4''-9''	10.4	9.8	7.9	.....	1.9	1.7	1.3	.....
	10'' up	3.3	3.1	2.6	.....	.....	.....	.....	.....
B. & W. Ash.....	4''-9''	19.7	18.5	15.1	.....	7.4	6.8	5.0	3.1
	10'' up	21.5	20.3	16.4	.....	5.8	5.3	3.9	.....
TOTAL HARDWOODS.....	4''-9''	1187.2	1118.0	908.4	198.0	1477.8	1352.8	989.2	408.4
	10'' up	1345.5	1267.2	1029.6	543.6	160.8	147.1	107.6	33.8
GRAND TOTAL.....	4''-9''	1279.0	1204.4	978.6	216.6	1624.8	1487.5	1087.6	445.2
	10'' up	1468.0	1382.6	1123.4	880.4	265.2	242.5	177.4	64.8
TOTAL 4'' UP.....		2747.0	2587.0	2102.0	1097.0	1890.0	1730.0	1265.0	510.0

TABLE 21 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	15.8 206.4	14.9 194.4	12.0 157.6	..... 267.9	21.9 69.5	20.5 65.1	16.2 51.4	4.7 29.5
Red pine.....	4"-9" 10" up	9.6 64.5	9.1 60.7	7.3 49.2	.....	22.5 42.5	21.0 39.8	16.6 31.4	11.7 43.0
Jack pine.....	4"-9" 10" up	184.0 249.0	173.4 234.6	140.4 190.0	6.3 60.1	305.7 143.2	286.1 134.0	225.9 105.8	124.7 47.8
White spruce.....	4"-9" 10" up	39.2 106.1	37.0 99.9	29.9 81.0	11.2 56.3	30.8 42.3	28.9 39.5	22.8 31.2	5.3 12.7
Black spruce.....	4"-9" 10" up	164.1 52.4	154.6 49.4	125.2 40.0	70.2 34.4	212.5 23.1	198.9 21.6	157.0 17.1	27.9 8.8
Balsam fir.....	4"-9" 10" up	188.7 44.9	177.8 42.3	144.1 34.2	67.9 21.4	121.7 18.4	114.0 17.2	90.0 13.6	42.3 11.2
White cedar.....	4"-9" 10" up	32.9 29.8	30.9 28.1	25.0 22.8	9.0 8.4	19.2 15.3	18.0 14.3	14.2 11.3	.....
TOTAL CONIFERS.....	4"-9" 10" up	634.3 753.1	597.7 709.4	483.9 574.8	164.6 448.5	734.3 354.3	687.4 331.5	542.7 261.8	216.6 153.0
White birch.....	4"-9" 10" up	232.1 183.9	218.7 173.2	177.1 140.3	83.1 178.3	174.9 36.3	163.7 34.0	129.3 26.8	29.5 6.6
Poplar (all).....	4"-9" 10" up	359.9 674.3	339.1 635.2	274.6 514.6	51.7 155.2	454.4 264.6	425.3 247.7	335.8 195.6	128.8 58.7
Red maple.....	4"-9" 10" up	9.7 1.7	9.1 1.6	7.4 1.3	6.1 1.5	10.9 1.3	10.2 1.2	8.0 1.0	2.4
B. & W. Ash.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	3.8 1.6
TOTAL HARDWOODS.....	4"-9" 10" up	601.7 859.9	566.9 810.0	459.1 656.2	140.9 335.0	640.2 302.2	599.2 282.9	473.1 223.4	164.5 66.9
GRAND TOTAL.....	4"-9" 10" up	1236.0 1613.0	1164.6 1519.4	943.0 1231.0	305.5 783.5	1374.5 656.5	1286.6 614.4	1015.8 485.2	381.1 219.9
TOTAL 4" UP.....		2849.0	2684.0	2174.0	1089.0	2031.0	1901.0	1501.0	601.0

*Common and Botanical Names of Tree Species  
included in Timber Estimates*

CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.

White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

HARDWOODS

White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar (all).....	<i>Populus tremuloides</i> Michx. <i>Populus tacamahacca</i> Mill. <i>Populus grandidentata</i> Michx.
Red maple.....	<i>Acer rubrum</i> L.
Ash.....	<i>Fraxinus americana</i> L. <i>Fraxinus nigra</i> Marsh.



## *Notes*

---

## *Notes*

---

# *Notes*

---









**Hon. Welland S. Gemmell**

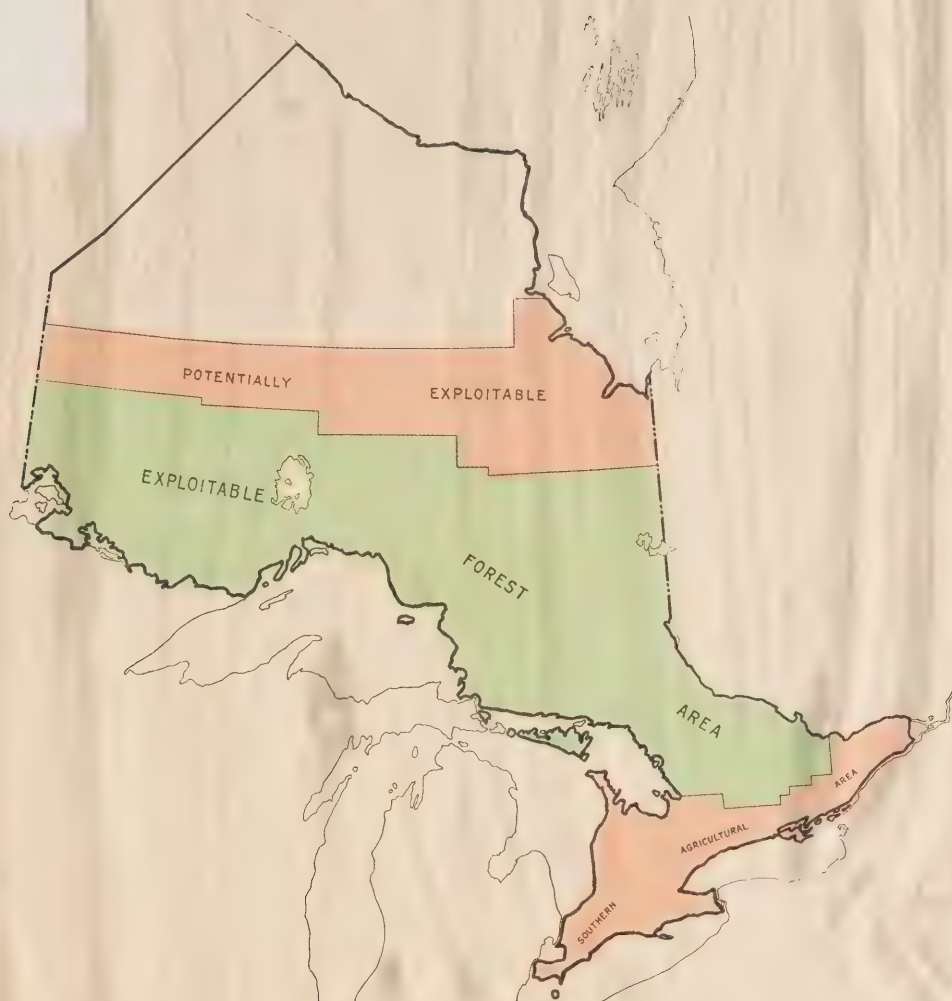
*Minister*

**F. A. MacDougall**

*Deputy Minister*

Report No. 7 of the  
**ALGONQUIN DISTRICT**

CAZON  
LF  
-F56



# *Forest Resources Inventory*

—1953—

Division of Timber Management

Ontario Department of Lands and Forests

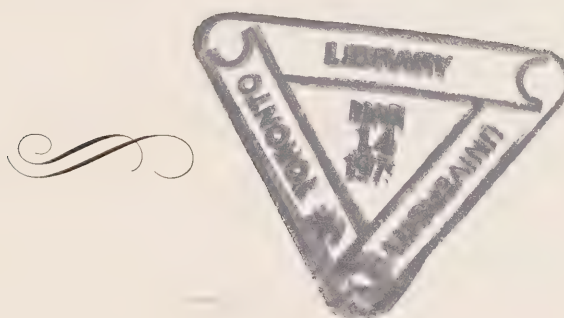




# *Forest Resources Inventory*

— 1953 —

Report No. 7 of the  
ALGONQUIN DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests

# PREFACE

● In 1946 the Ontario Government set in motion plans for carrying out a forest resources inventory covering all of the exploitable forests within the borders of the province. The Timber Management Division of the Ontario Department of Lands and Forests was given the task of organizing and carrying out this inventory within a specified time of 5 years. All non-forested land, waste land and water areas were to be considered within the framework of the inventory, as well as all the productive and potential forest areas. This total area covers some 172,000 square miles and includes an area bounded on the north by the fifty-first parallel of north latitude in Northwestern Ontario and the fiftieth parallel north in Northeastern Ontario; to the east by the Province of Quebec, down the Ottawa River to Arnprior and south to Perth. The southern boundary extends from Perth southwesterly to Madoc and then slightly northwesterly to Penetanguishene. From there it follows the northeast shore of Georgian Bay, thence along the north shore of the North Channel and along the north shore of Lake Superior to the international boundary, thence along the international boundary to the Manitoba-Ontario boundary. The west boundary follows the Manitoba-Ontario boundary north to the fifty-first parallel of north latitude.

Vertical air photographs of this entire area presented the fastest and by far the most satisfactory way of producing the necessary maps and provided the means by which photo interpretation, so necessary in an inventory of this magnitude, could be carried out.

The Federal Government through the Canada Forestry Act will reimburse to the province one-half of the expenditure incurred in all inventory work done after March 31, 1951.

The Ontario Department of Lands and Forests administers the renewable natural resources throughout twenty-two forest districts, each headed by a District Forester and staff. Sixteen and parts of two other districts have been covered by the forest resources inventory for the purpose of ascertaining the location and extent of all productive forest lands and the volume of wood growing upon them. This report deals with the results of inventory in the Algonquin district.

In this forest district, with headquarters in Pembroke, lie the rich lands of the Ottawa River basin. Farming has developed extensively near centers of population, but the backbone of this country has been the lumbering industry. Famed Algonquin Provincial Park with its many lakes and fine scenery is located within this district. The Algonquin district as a whole may well be called a tourist playground, and for this reason the aesthetic characteristics of the forests must be given due consideration, as well as their potential productivity of wood, in their effect on the economic and social welfare of the area.

It was in this district that the Petawawa management unit was established. As an area of approximately 1,000 square miles it has acted as a pilot plant in order to study and steer the course of forest management techniques to be applied throughout Ontario.

Lumbering is still the most important forest industry in the district; but with the expansion and spread of pulp and paper mills in Southern Ontario, more and more demands are being met to supply pulpwood from the Algonquin district forests. The match, furniture and veneer industries are ready buyers in the tree markets of this district. This already over-heavy demand for diversified forest products, coupled with a noticeable diminishing supply, bears out the far-sighted policy of undertaking the study and promotion of good forest management in Ontario, soundly based on the forest resources inventory.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	19
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	23
AREAS.....	9		
REGIONAL FOREST CLASSIFICATION.....	9	APPENDIX.....	26
FOREST LAND OWNERSHIP.....	9	SURVEY METHODS.....	26
FOREST COVER TYPES AND SPECIES.....	10	MEAN ANNUAL INCREMENT.....	26
AGE CLASS.....	11	AGE CLASSES.....	26
VOLUME.....	12	ROTATION.....	26
CONIFERS VS. HARDWOODS.....	14	ALLOWABLE CUT.....	27
LARGE VS. SMALL TREES.....	16	CULL FACTORS.....	27

## FIGURES

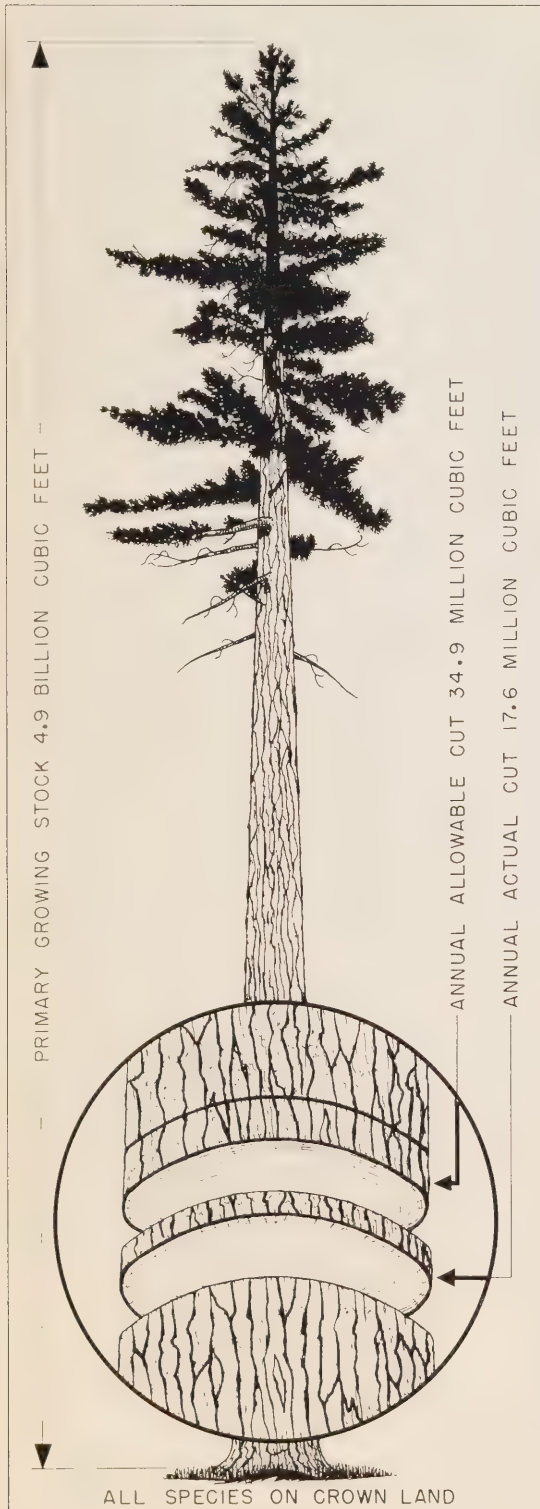
FIG. 1 — TOTAL LAND CLASSIFICATION INTO BROAD LAND CLASSES.....	9	FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF CONIFERS ON THE PRODUCTIVE FOREST AREA BY AGE AND SIZE CLASSES AND SPECIES.....	18
FIG. 2 — ALGONQUIN DISTRICT, 1951.....	10		
FIG. 3 — PROPORTION OF AGE CLASSES BY PERCENT OF PRODUCTIVE FOREST AREA AND LAND OWNERSHIP.....	11	FIG. 12 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOODS ON THE PRODUCTIVE FOREST AREA BY AGE AND SIZE CLASSES AND SPECIES.....	19
FIG. 4 — VOLUME OF PRIMARY GROWING STOCK OF MATURE AND IMMATURE AGE CLASSES BY OWNER- SHIP.....	13	FIG. 13 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE ALGONQUIN DISTRICT.....	22
FIG. 5 — VOLUME IN PERCENT OF THE TOTAL PRIMARY GROWING STOCK BY COVER TYPES.....	13	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND IN THE ALGONQUIN DISTRICT.....	22
FIG. 6 — VOLUME OF PRIMARY GROWING STOCK OF CONIFERS ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	15	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LANDS IN THE ALGONQUIN DISTRICT.....	23
FIG. 7 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LANDS BY SPECIES AND AGE CLASSES.....	15	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LANDS IN THE ALGONQUIN DISTRICT.....	24
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LANDS BY SPECIES AND AGE CLASSES IN THE ALGONQUIN DISTRICT.....	16	FIG. 17 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS BY SPECIES ON CROWN LAND.....	24
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LANDS BY SPECIES AND AGE CLASSES IN THE ALGONQUIN DISTRICT.....	17	FIG. 18 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF HARDWOODS BY SPECIES ON CROWN LAND.....	25
FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON THE PRODUCTIVE FOREST AREA BY SIZE CLASSES AND AGE CLASSES.....	17		







# SURVEY HIGHLIGHTS



1. The total area of the Algonquin district is 3,336,362 acres or 5,213 square miles. The cover type distribution within the productive forest area is 13 per cent coniferous, 40 per cent hardwood, 46 per cent mixedwood; and by age classes is 10 per cent regeneration and reproducing forest area, 66 per cent immature forests and 24 per cent mature forest area.

2. Privately owned land covers 719,935 acres or 24 per cent of the total land area in the district. Developed agricultural lands occupy 287,616 acres or about 40 per cent of the total patented land area.

3. The gross total volume of standing timber in the district is 5,713,978,000 cubic feet. Of this volume, 4.9 billion cubic feet is growing on Crown lands, while about 808 million is on patented lands.

4. The annual allowable cut, or gross depletion allowable under sustained yield management, is slightly over 56 million cubic feet, with 13 million being coniferous species and 43 million being hardwoods. Of this total figure 35 million cubic feet is on Crown lands, while 21 million is on patented lands.

5. The coniferous species make up about 24 per cent of the total allowable cut, and hardwood species comprise the balance or 76 per cent. Hard maple and yellow birch form the bulk of the hardwood allowable cut on Crown lands while hemlock, white pine and white spruce form over half the allowable cut of conifers.

6. A comparison of the allowable cut on Crown lands with actual utilization indicates that if white and red pine are to be cut at the present rate of 4,859 thousand cubic feet per year, then the existing mature timber will be exhausted within the next nine years. At the end of this period, utilization of these two pines may either cease until other stands become mature, or immature stands would have to be cut which, of course, is against the accepted practices of forest management.

7. A different problem is represented by hard maple and birch, both yellow and white. The actual annual cut of these species is much lower than the allowable cut indicates. Restricted cutting of these species causes undesirable accumulation of over-mature stands, where losses on increment in both quality and quantity appear inevitable.



MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50

MARCH, 1953



*Forest resources inventory photograph of Town of Pembroke taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area of the Algonquin district excluding the Petawawa Military Area and Indian Reservations is 3,336,362 acres or 5,213 square miles and is made up of 69 townships. In table 1 is to be found the classification of this area into broad land and ownership groups. Water covers an area of 274,431 acres or about 8 per cent of the total area, leaving a land area of 3,061,931 acres. Non-productive forest lands, which are unfit for commercial timber production, due to their submarginal growing capacity, occupy 173,451 acres. Brush and alder lands occupy about 53 per cent, open muskeg about 32 per cent, and treed muskeg about 15 per cent of this non-productive forest area. Non-forested lands which are withdrawn from timber production make up 324,799 acres in the district with about 89 per cent

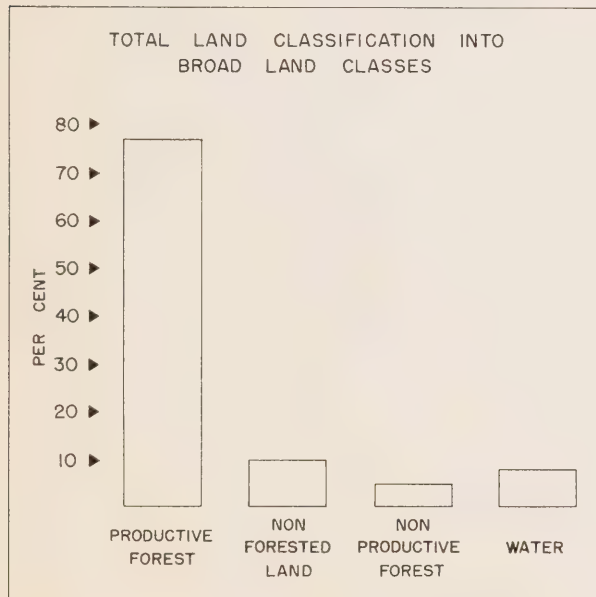


FIGURE 1

of this area being classed as developed agricultural lands. Six per cent is devoted to roads, towns, etc., 4 per cent is grass land and one per cent is non-reproducing burn. Of the 3,336,362 acres within the Algonquin district, about 77 per cent is productive forest land, 10 per cent is non-forested land, 5 per cent is non-productive forest land and 8 per cent is water (fig.1). In consideration of the district location, its general accessibility by roads, and the nearness to markets for wood products, it might be expected

to find far less area devoted to forest crops than is evident.

## Regional Forest Classification

The Algonquin district lies within what is commonly called the Great Lakes-St. Lawrence Forest Region, being based on a broad uniformity of tree species associations resulting from a combination of local climatic conditions, soil and rock formations and general topography influencing soil moisture. The whole district comes within the Algonquin section which forms part of the Great Lakes-St. Lawrence forest region. This section is characterized by the bed rock formation of crystalline limestones, schists and gneisses of the altered sedimentaries and granite intrusives common to the great Pre-Cambrian Shield of Canada.

In this section, white and red pine reached its maximum development but extensive lumbering and fire have removed the greater part. In spite of the previous dominance of these species and the presence of other conifers, the general character is that of a mixed forest and the dominant or competitive association is formed by hard maple, yellow birch, hemlock, red and white pine with jack pine, poplar and white birch resulting from fire.

The topography is rough and irregular and glacial deposits of a light texture cover the greater part of the area. In addition there are some lacustrine deposits from the Nipissing-Great Lakes and Algonquin periods conducive to the growth of pines.

Climatic conditions are somewhat tempered by the general southern location which promotes earlier spring breakups and a somewhat later autumn. Precipitation is normal for the area and the light soils do not retain the moisture to a very great extent. Lakes and rivers are numerous, providing adequate drainage basins.

## Forest Land Ownership

In Ontario it has been the generally accepted policy to retain forest lands in public ownership while leasing the rights to cut and remove timber from them. Lands suitable for agriculture have been opened for settlement, and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resorts and other uses. All of these various

types of ownership are grouped under "Patented Lands" which include all lands owned privately in contrast with Crown lands. It has been the usual practice in this province to reserve all pine timber to the Crown at the time patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands presents an exceedingly complicated subject and in the course of establishing a classification for ownership in inventory no attempt has been made to record separately, timber occurring on patented lands but reserved to and owned by the Crown. All recorded patented land is treated as such, whether or not timber rights are vested in the Crown.

Crown lands occupy an area of 2,341,996 acres, excluding water, and patented lands cover 719,935 acres or about 77 and 23 per cent of the total land area respectively. If, however, only productive forest land is considered, 85 per cent of this area is Crown

TABLE 1. — *Total area classification into broad land and ownership groups.*

Land classification	Crown land	Patented land	Total
	<i>acres</i>	<i>acres</i>	<i>acres</i>
Productive forest land <sup>1</sup> .....	2,176,322	387,359	2,563,681
Non-forested land <sup>2</sup>			
Developed agricultural land.....	3,201	284,415	287,616
Grass and meadow land.....	2,812	11,298	14,110
Non-reproducing burn.....	2,319	387	2,706
Unclassified land <sup>3</sup> .....	6,029	14,338	20,367
TOTAL.....	14,361	310,438	324,799
Non-productive forest <sup>4</sup>			
Open muskeg.....	51,323	3,846	55,169
Treed muskeg (scrub).....	24,267	1,440	25,707
Brush, alder and flooded land.....	74,780	16,846	91,626
Rock outcrop.....	188	.....	188
Barrens.....	755	6	761
TOTAL.....	151,313	22,138	173,451
Total land area.....	2,341,996	719,935	3,061,931
Water.....	274,431	.....	274,431
TOTAL AREA.....	2,616,427	719,935	3,336,362

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Forest lands withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, mills etc.

<sup>4</sup> Lands unfit for commercial timber production, due to their sub-marginal growing capacity.

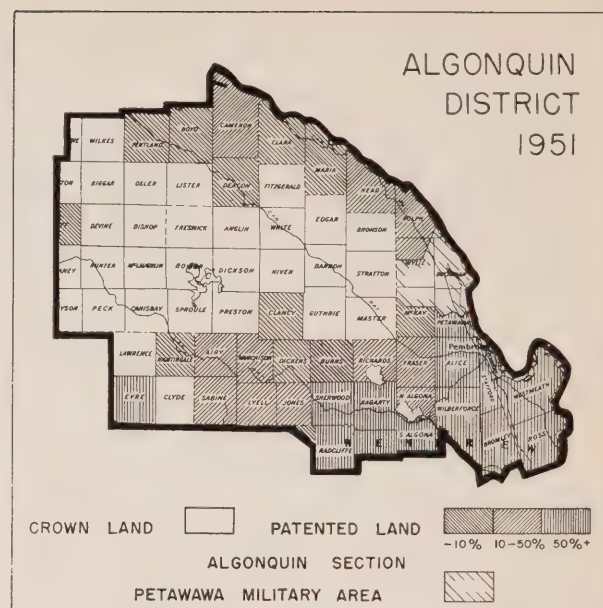


FIGURE 2

land and 15 per cent is patented (table 1).

Figure 2 shows the Crown lands by townships in the Algonquin district and the patented land by townships is divided into three categories; townships in which less than 10 per cent of the land is patented, townships having between 10 and 50 per cent of their area patented and townships with over 50 per cent patented.

Developed agricultural land occupies 287,616 acres in the entire district with 3,201 acres of this being shown in Crown ownership. This is for the most part located land for which patent has not been issued.

### Forest Cover Types and Species

As the Algonquin district lies within the best pine-producing areas in Ontario it would be expected to find white and red pine in abundance. This is true of the past but due to the fine qualities of these species and their abundance in years gone by, very heavy demands have been made on them for use in lumber production, poles and piling, matches, containers and many other products to which they are well suited. Owing to cutting and fire, these "pineries" have now a secondary association of trembling aspen, large-toothed aspen, white birch, balsam fir and white spruce with scattered red maple, red oak and ironwood; on the lighter soils jack pine is also found in abundance. In addition there are varying amounts of basswood, beech, red oak, white elm, white ash, black cherry and eastern hemlock. A

characteristic feature of the area appears to be stands of pure hardwood, with a dominance of hard maple, yellow birch, poplar and white birch and a common occurrence of red maple, black ash or eastern white cedar swamps. Throughout the district black spruce, larch and white cedar are found in swampy depressions.

As previously stated, the general forest condition is one of a mixed species character. Most of the forest area in the district is covered by the mixed-wood type (46 per cent) and the hardwood type (40 per cent). The coniferous type occupies only a small portion of the productive forest area (13 per cent). With this group of cover types is the reproducing forest, covering about one per cent of the area, which differs only from the regeneration area by virtue of the fact that no cover type classification can be affixed to this area of the productive forest. Owing to the small amount present, it can be disregarded as a separate factor and included with the three main cover types.

For the purpose of inventory, this cover type classification is based on the number of stems in the stand, regardless of species, over 3.5 inches d.b.h. Over 75 per cent hardwood species classes the stand as the hardwood cover type, 25 to 75 per

TABLE 2. — *Percentage of the primary growing stock by species on productive forest lands in the Algonquin district in mature and immature stands.*

Species	Mature age class <i>per cent</i>	Immature age class <i>per cent</i>	Productive forest <i>per cent</i>
White pine.....	2.4	14.8	10.5
Red pine.....	0.3	4.6	3.1
Jack pine ..	1.1	2.5	2.0
White spruce.....	1.9	3.6	3.0
Black spruce.....	0.3	1.1	0.8
Balsam fir.....	1.5	4.9	3.7
Eastern hemlock.....	12.7	4.7	7.5
White cedar.....	1.4	1.7	1.6
Larch.....	.....	0.1	0.1
<b>TOTAL CONIFERS.....</b>	<b>21.6</b>	<b>38.0</b>	<b>32.3</b>
Hard maple.....	37.8	17.1	24.3
Yellow birch.....	31.3	8.7	16.5
Beech.....	3.3	1.9	2.4
White elm.....	0.4	0.8	0.7
Ironwood.....	0.5	0.6	0.5
Red oak.....	0.1	1.3	0.9
White birch.....	1.7	11.2	7.9
Poplar (all).....	1.3	16.5	11.2
Red maple.....	0.4	1.4	1.1
Ash (black and white).....	0.7	1.6	1.3
Basswood.....	0.8	0.6	0.7
Black cherry.....	0.1	0.3	0.2
<b>TOTAL HARDWOODS.....</b>	<b>78.4</b>	<b>62.0</b>	<b>67.7</b>

cent hardwood species and the stand is classed as mixedwood, while below 25 per cent hardwoods in the stand and it is classed as coniferous.

Within the district, twenty-one species have been recorded (table 2). It is apparent that hardwood species make up the major proportion of the primary growing stock and that the complexity of species makes for a very mixed type of forest with no one species being overly predominant. It is reasonable to believe that future forests will be a hardwood-coniferous admixture with hardwoods dominant throughout. This would certainly preclude the possibility of this district becoming the great pine-producing area it once was unless a great deal of time, energy and money is spent to convert, through extensive silvicultural practices or by artificial means, the hardwood-dominated forests to their original pine composition.

### Age Class

The forests of Ontario have been segregated into three major age classes for inventory purposes. These are: mature forests, which includes over-mature stands as well and can be described as trees

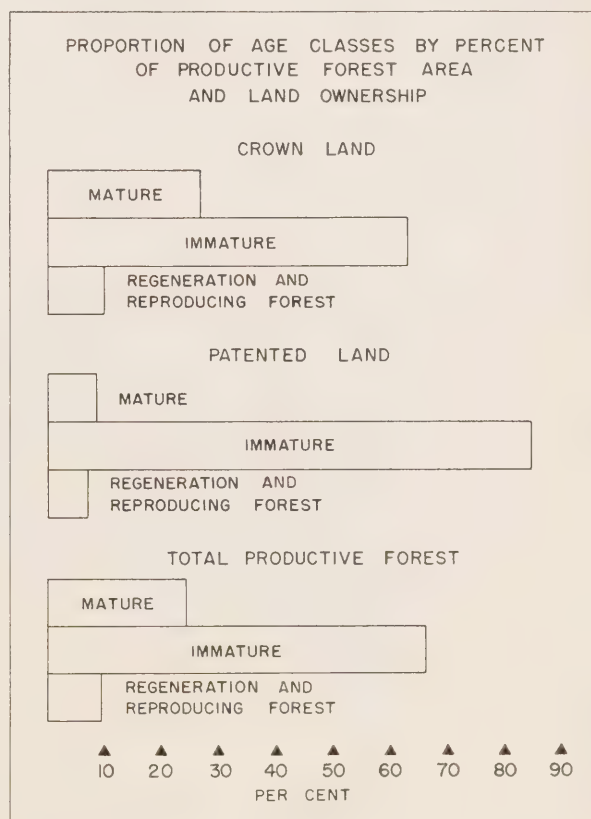


FIGURE 3



at or over their rotation age; immature forests from one-third rotation age up to rotation age but over 3.5 inches d.b.h.; and regeneration, which embraces all stands below one-third rotation age or under 3.6 inches d.b.h. This latter age class also includes reproducing forests, which indicates that no specific

TABLE 3. — *Area classification of productive forest land into age classes, cover types and land ownership.*

Age class and cover type	Crown land	Patented land	Total	Productive forest
	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>per cent</i>
Mature forest:				
Coniferous.....	36,018	2,575	38,593	2
Hardwood.....	316,881	23,175	340,056	13
Mixedwood.....	232,267	6,835	239,102	9
TOTAL.....	585,166	32,585	617,751	24
Immature forest:				
Coniferous.....	196,905	53,043	249,948	10
Hardwood.....	422,912	115,503	538,415	21
Mixedwood.....	753,231	158,364	911,595	35
TOTAL.....	1,373,048	326,910	1,699,958	66
Regeneration:				
Coniferous.....	6,979	3,562	10,541	1
Hardwood.....	146,732	16,437	163,169	6
Mixedwood.....	39,980	5,044	45,024	2
TOTAL.....	193,691	25,043	218,734	9
Reproducing forest.....	24,417	2,821	27,238	1
TOTAL PRODUCTIVE FOREST.....	2,176,322	387,359	2,563,681	

cover type can be determined immediately after blowdown, insect killing of the main stand, clear cutting or burns that are starting to reproduce.

The immature age class covers by far the greatest area in the district on both Crown and patented lands (fig. 3). This would indicate a building up of the forests to provide an increased allowable cut in the future. However, the present picture demands that a close control of cutting must be carried out in order to ensure adequate future stands.

The mature age class covers only 24 per cent of the productive forest area, while the immature age class covers 66 per cent, and the regeneration age class and reproducing forest cover 10 per cent (table 3).

A comparison of species representation in the mature and immature age classes indicates that there will be a progressive decrease in volume of hemlock, hard maple and yellow birch with a simultaneous increase in volume of the remaining conifers, as well as white birch and poplar. White and red pine will increase in volume due to the relatively higher percentage of their volume in the immature age class.

#### Volume

The volume of the primary growing stock includes all living trees 3.6 inches d.b.h. outside bark, and over on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and the cull or defective portions of the tree, but excludes all limb wood. It is actually gross total volume in cubic feet.

The primary growing stock on the total productive forest land in the Algonquin district amounts to



*Marking trees to be felled in a young pine stand on the Petawawa management unit.*

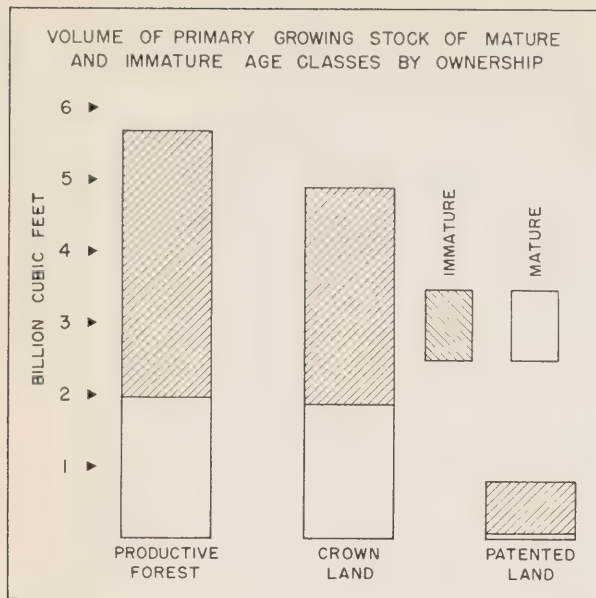


FIGURE 4

5,713,978,000 cubic feet or 2,229 cubic feet per acre. This amount is broken down into 1,981,897,000 cubic feet or 3,208 cubic feet per acre for the mature forest area and 3,732,081,000 cubic feet or 2,195 cubic feet per acre for the immature forest area (fig. 4) (tables 4 and 5). As an observation of these figures will indicate, the smaller volume of mature forests is concentrated on only 24 per cent of the productive forest area and therefore accounts for the higher volume on a per acre basis.

TABLE 4. — *The average volume per acre of the primary growing stock.*

	Crown land			Patented land			All lands
Age classes and cover types	4''-9'' d.b.h.	10''up d.b.h.	Total	4''-9'' d.b.h.	10''up d.b.h.	Total	
Mature age class:	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Coniferous.....	698	1,739	2,437	900	1,914	2,814	2,462
Hardwood.....	460	2,830	3,290	459	2,532	2,991	3,269
Mixedwood.....	523	2,717	3,240	534	2,765	3,299	3,242
AVERAGE.....	500	2,718	3,218	509	2,532	3,041	3,208
Immature age class:							
Coniferous.....	1,108	1,014	2,122	1,161	1,149	2,310	2,162
Hardwood.....	874	1,185	2,059	837	1,221	2,058	2,059
Mixedwood.....	1,086	1,216	2,302	1,000	1,206	2,206	2,285
AVERAGE.....	1,023	1,178	2,201	968	1,202	2,170	2,195
TOTAL PRODUCTIVE FOREST.....	780	1,474	2,254	860	1,228	2,088	2,229

The volumes per acre for each cover type in both the mature and immature age classes are quite good with the exception of the 4-9 inch size class throughout. This is a normal condition based on the fact that the species found in this ecological section are of the large growing variety, and, of course, the average size of trees over 10 inches d.b.h. is greater than in other parts of Ontario. It is not of as vital importance to consider the smaller size class in assessing the future possibilities of the Algonquin district forests as it is to consider the immature age class. Here it is evident that the volume per acre is generally good in all cover types, even though it averages about 1,000 cubic feet per acre below that of the mature forests (table 4).

The coniferous cover type contains only 95 million cubic feet of wood in the mature age class and 540 million in the immature. This is of interest in comparison with the hardwood type which contains 1.1 billion cubic feet in each of the two age classes, and the mixedwood type contains 775 million cubic feet in the mature age class as compared to 2.1 billion cubic feet in the immature (table 5). These three cover types contain 11, 39 and 50 per cent respectively of the primary growing stock (fig. 5).

Crown lands within the Algonquin district contain about 4.9 billion cubic feet of the primary growing stock, while patented lands support only 808 million cubic feet. The bulk of this volume is in the hardwood and mixedwood cover types.

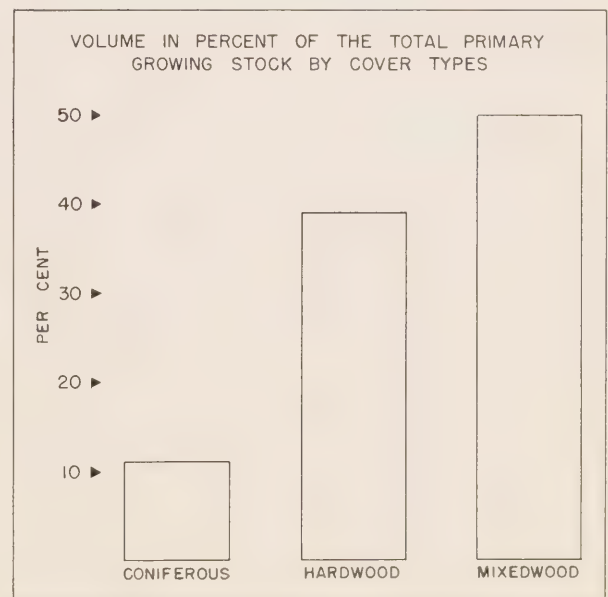


FIGURE 5



TABLE 5. — *Cubic-foot volumes of primary growing stock on productive forest land in the Algonquin district by cover types, species groups, age classes, land ownership and two size classes.*

Type and species group	Size class	MATURE			IMMATURE			TOTAL			
		Crown	Patent	Total	Crown	Patent	Total	Crown	Patent	Total	
	d.b.h.	Thousand cubic feet			Thousand cubic feet			Thousand cubic feet			
CONIFEROUS											
Conifers.....	4''-9'' 10'' up	21,545 50,625	2,040 3,884	23,585 54,509	181,731 166,464	53,031 48,938	234,762 215,402	203,276 217,089	55,071 52,822	258,347 269,911	
Hardwoods.....	4''-9'' 10'' up	3,613 12,006	278 1,045	3,891 13,051	36,358 33,237	8,565 12,011	44,923 45,248	39,971 45,243	8,843 13,056	48,814 58,299	
TOTAL.....	4''-9'' 10'' up	25,158 62,631	2,318 4,929	27,476 67,560	218,089 199,701	61,596 60,949	279,685 260,650	243,247 262,332	63,914 65,878	307,161 328,210	
TOTAL 4'' UP.....											
		87,789	7,247	95,036	417,790	122,545	540,335	505,579	129,792	635,371	
HARDWOOD											
Conifers.....	4''-9'' 10'' up	13,107 43,580	1,033 3,078	14,140 46,658	25,631 38,970	5,374 9,299	31,005 48,269	38,738 82,550	6,407 12,377	45,145 94,927	
Hardwoods.....	4''-9'' 10'' up	132,727 853,072	9,590 55,609	142,317 908,681	343,923 462,417	91,276 131,715	435,199 594,132	476,650 1,315,489	100,866 187,324	577,516 1,502,813	
TOTAL.....	4''-9'' 10'' up	145,834 896,652	10,623 58,687	156,457 955,339	369,554 501,387	96,650 141,014	466,204 642,401	515,388 1,398,039	107,273 199,701	622,661 1,597,740	
TOTAL 4'' UP.....											
		1,042,486	69,310	1,111,796	870,941	237,664	1,108,605	1,913,427	306,974	2,220,401	
MIXEDWOOD											
Conifers.....	4''-9'' 10'' up	56,795 224,841	1,681 6,838	58,476 231,679	345,338 400,373	67,605 75,534	412,943 475,907	402,133 625,214	69,286 82,372	471,419 707,586	
Hardwoods.....	4''-9'' 10'' up	64,634 406,249	1,967 12,060	66,601 418,309	472,463 515,600	90,710 115,518	563,173 631,118	537,097 921,849	92,677 127,578	629,774 1,049,427	
TOTAL.....	4''-9'' 10'' up	121,429 631,090	3,648 18,898	125,077 649,988	817,801 915,973	158,315 191,052	976,116 1,107,025	939,230 1,547,063	161,963 209,950	1,101,193 1,757,013	
TOTAL 4'' UP.....											
		752,519	22,546	775,065	1,733,774	349,367	2,083,141	2,486,293	371,913	2,858,206	
ALL TYPES 4'' UP.....											
		1,882,794	99,103	1,981,897	3,022,505	709,576	3,732,081	4,905,299	808,679	5,713,978	

### *Conifers vs. Hardwoods*

The lumber industry, which has operated in the Algonquin district for many years, has reduced to a minimum the quantity of mature coniferous species in general, leaving, according to inventory, about 1.85 billion cubic feet on the productive forest area. This is made up of 429 million cubic feet of mature timber and 1.42 billion cubic feet of immature growing stock which is further evidence of the inroads of logging in the past. Of the 1.85 billion cubic feet in all, white pine contains the largest quantity, or approximately 600 million cubic feet. Hemlock has 428 million cubic feet. The marked difference is that the white pine volume is 92 per cent in the immature age class, and hemlock volume is 59 per cent in the mature age class. All other coniferous species show a much greater volume in the immature age class than in the mature.

In the hardwoods, only hard maple and yellow birch show a greater volume in the mature class with 54 and 66 per cent respectively. Hardwoods far outbalance the conifers in volume both in the



*Uncut stand of white pine timber.*

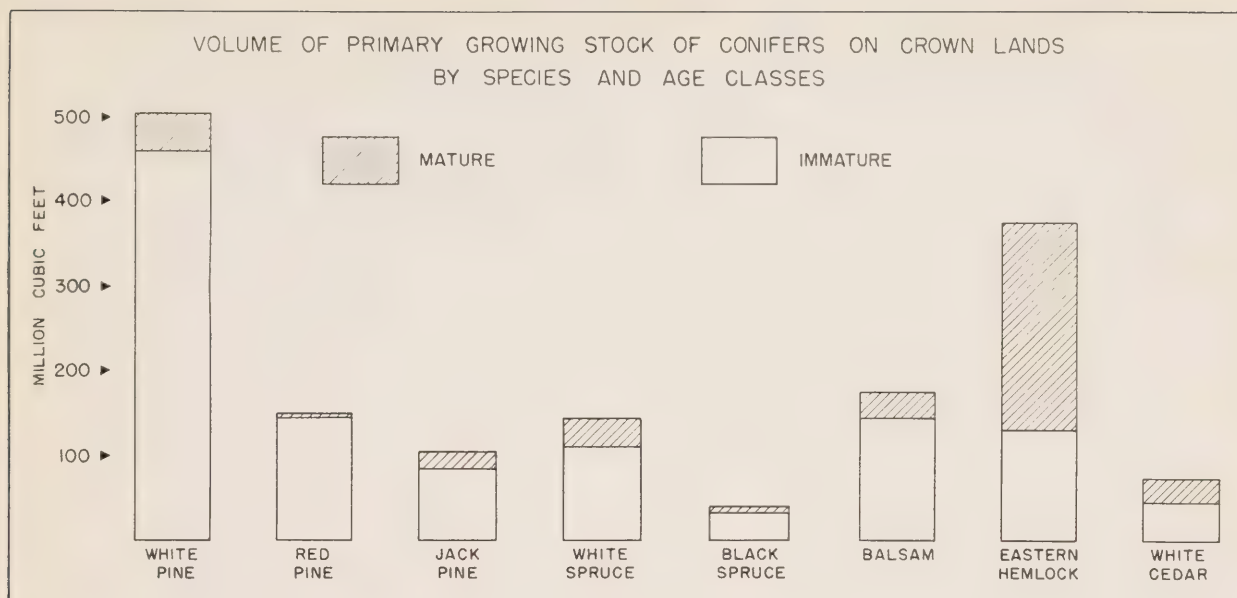


FIGURE 6

mature and immature class with 78 per cent and 62 per cent in each of the age classes (table 6).

On Crown lands alone the same picture holds true with regard to the conifers, with hemlock being

the only conifer with a greater volume in the mature age class than in the immature. Hardwoods show the same tendencies on Crown forests as when considering the total productive forest area, with hard

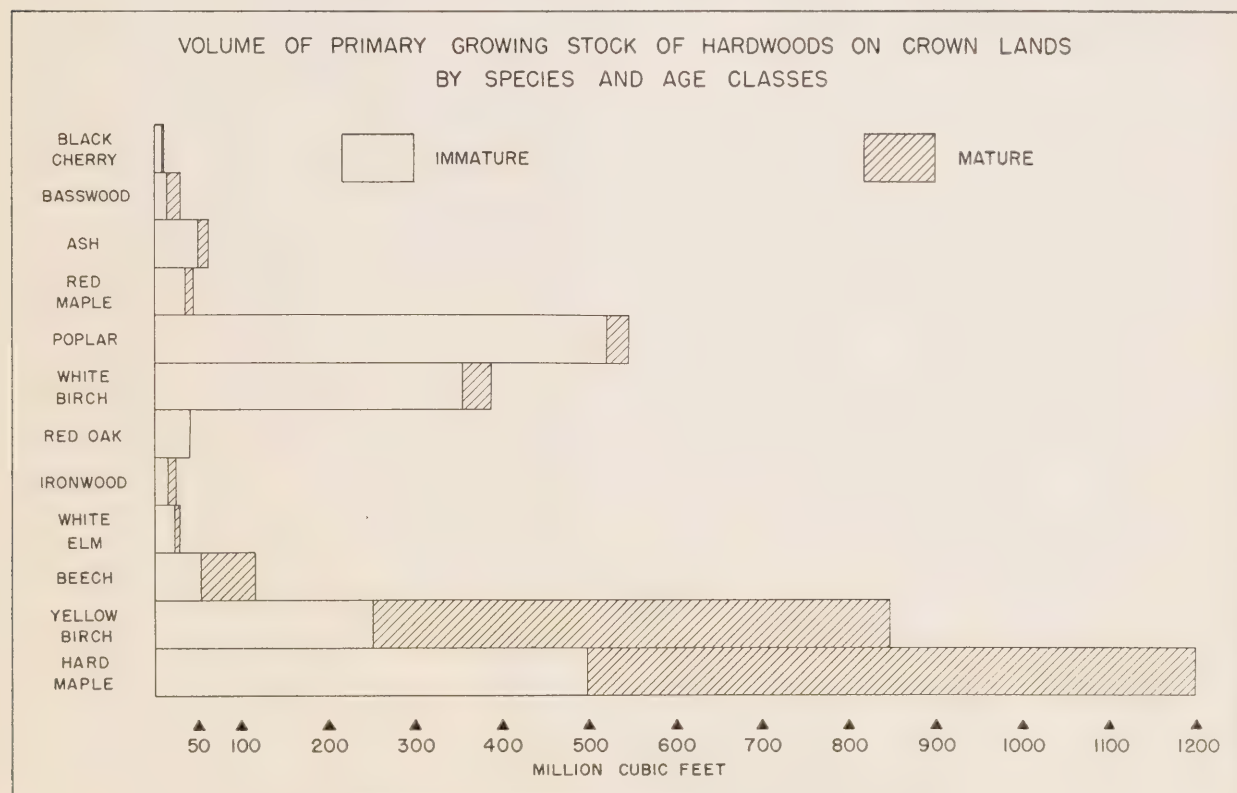


FIGURE 7



maple and yellow birch having their greater volumes in the mature age class. Beech, however, also shows 53 per cent of its volume in this class. All the other hardwoods have a preponderance of their volume in the immature age (table 7) (figs. 6 and 7).

Patented lands represent only 15 per cent of the productive forest area in the district and support 14 per cent of the primary growing stock, which is made up of 278 million cubic feet in coniferous species and 530 million cubic feet of hardwoods. In conifers only 7 per cent of the growing stock is mature with each and every species having the bulk of its volume in the immature age class. This, again, is the result of heavy cutting in the past. The hardwoods, carrying nearly double the volume of conifers, show 15 per cent of their volume in the mature stands with all species carrying the major portion of their volumes on the immature stands (table 8) (figs. 8 and 9).

In view of these figures on volume of primary growing stock, it is evident that white pine is the leading coniferous species on both Crown and patented land and that hard maple is the leading hardwood species. Hemlock comes next to white pine in volume and yellow birch comes next to hard maple, with poplar and then white birch following fairly close to the volume of yellow birch. This holds true on both the Crown and patented lands within the district.

### *Large vs. Small Trees*

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as cordwood or pulpwood material, depending on the species. However, poles, railway ties, small dimensional stock and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for sawlogs, veneer and other uses where large timber is required. A tree 10 inches d.b.h. outside bark will on the average give a log sixteen feet long, 8 inches in diameter at the small end. In addition there is residual small-size material in the top which may be used for purposes other than saw timber. The volume of this residual top is relatively small and is included in the 10 inch d.b.h. and over material in all inventory estimates. With better utilization practices and where the economic possibilities are favorable, these tops are being used on an increasing scale.

The volume in the mature growing stock on the productive forest area is 309 million cubic feet in the 4-9 inch group and 1.67 billion cubic feet in the 10 inch and over group, while in the immature age class a volume of 1.72 billion exists in the smaller size group as compared to 2 billion cubic feet in the larger size group (fig. 10).

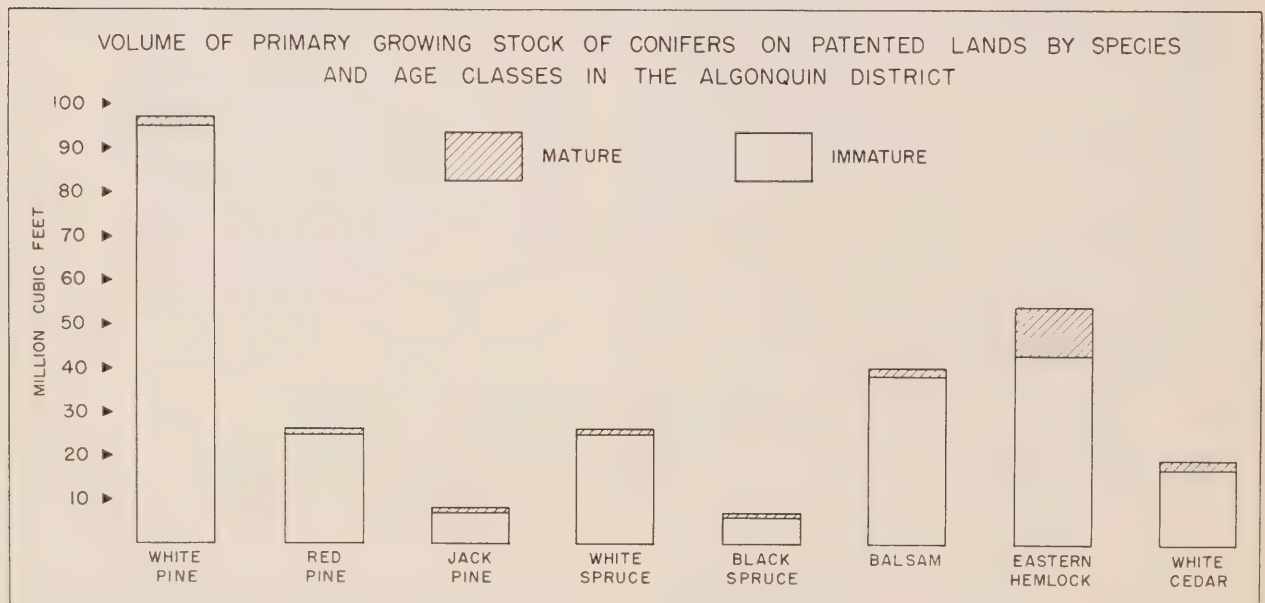


FIGURE 8

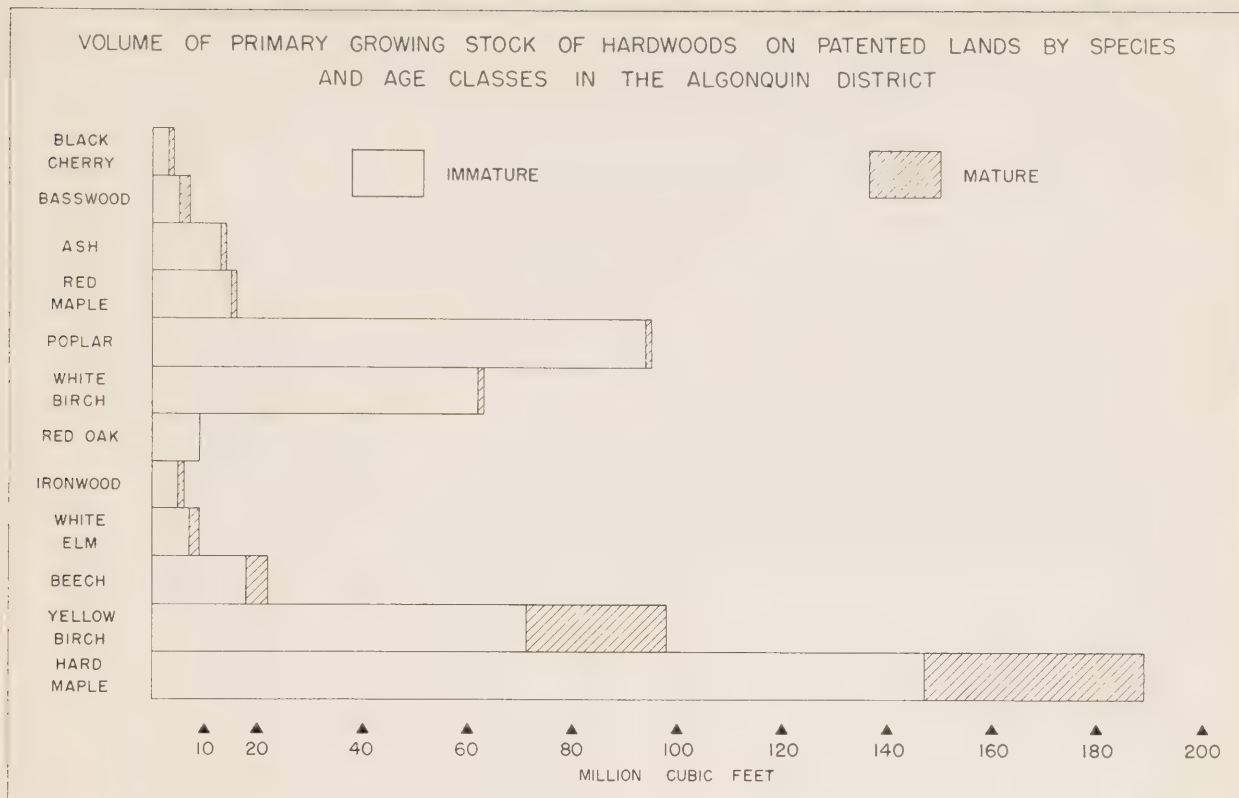


FIGURE 9

All coniferous growing stock shows a volume of 775 million cubic feet to 1.07 billion cubic feet in the 4-9 and 10 inch and over size classes respectively.

Hardwoods collectively show 1.26 billion cubic feet in comparison to 2.61 billion in the small and large-size trees respectively.

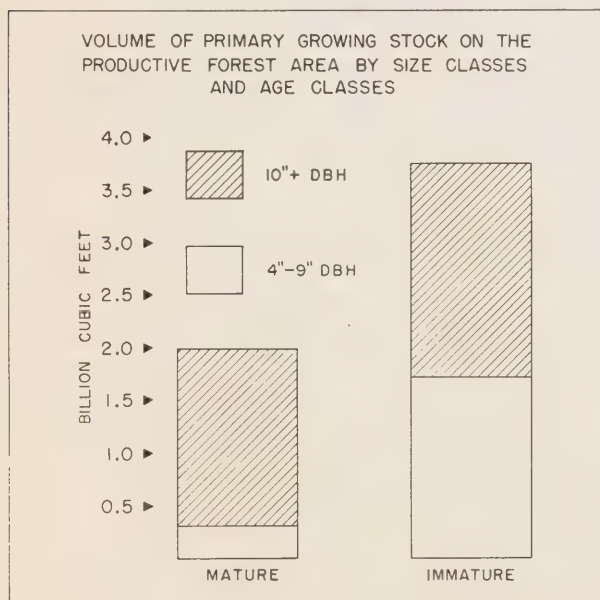


FIGURE 10

The most important age class to consider from an operational standpoint is the mature portion of the forest, and it is evident that all species with the exception of black spruce, balsam fir and ironwood have more volume in the larger size class. White pine, white spruce, hemlock, hard maple, yellow birch, white elm and basswood—all have over five times as much volume in the 10 inches and over size as in the 4-9 inch class. In the immature portion of the forest white pine, hemlock, hard maple, yellow birch, beech, white elm and basswood support substantially more volume in the larger sizes than do the same species in the smaller sizes. Red pine, white spruce, poplar and ash volumes are about equal in both size groups, and all the remaining species have less volume in the 10 inch and over class (figs. 11 and 12) (table 6).

Hemlock is the only coniferous species that has more volume in its mature age class than in immature. This is no doubt due to the dubious qualities of this species for use as lumber as it is subject to

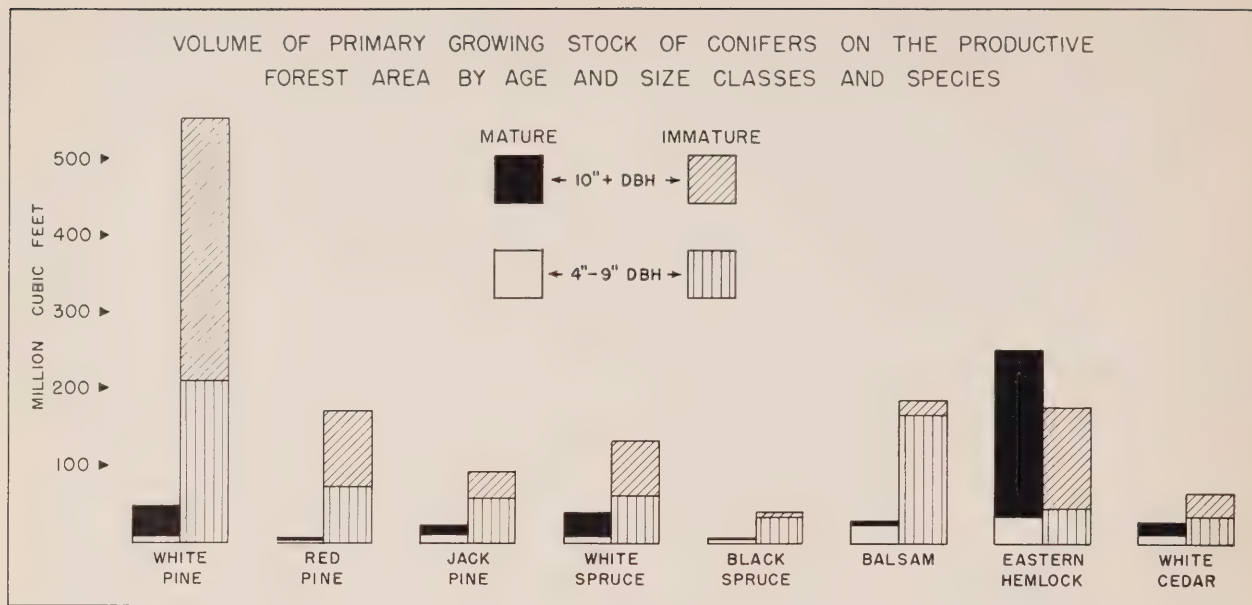


FIGURE 11

a great deal of cull, especially in the older trees. Hard maple and yellow birch are the only hardwoods having greater volumes in the mature in comparison with the immature age class. This, again, is probably due to the high cull characteristics of old trees in both these species. Of final interest is the large

proportion of poplar and white birch volume in the immature age class. This will undoubtedly present a definite problem in utilization in order to keep these species in check so that they will not eventually crowd out the more desirable species.



*Marked trees are cut leaving a thrifty growing forest for a second cut.*



VOLUME OF PRIMARY GROWING STOCK OF HARDWOODS ON THE PRODUCTIVE FOREST AREA BY AGE AND SIZE CLASSES AND SPECIES

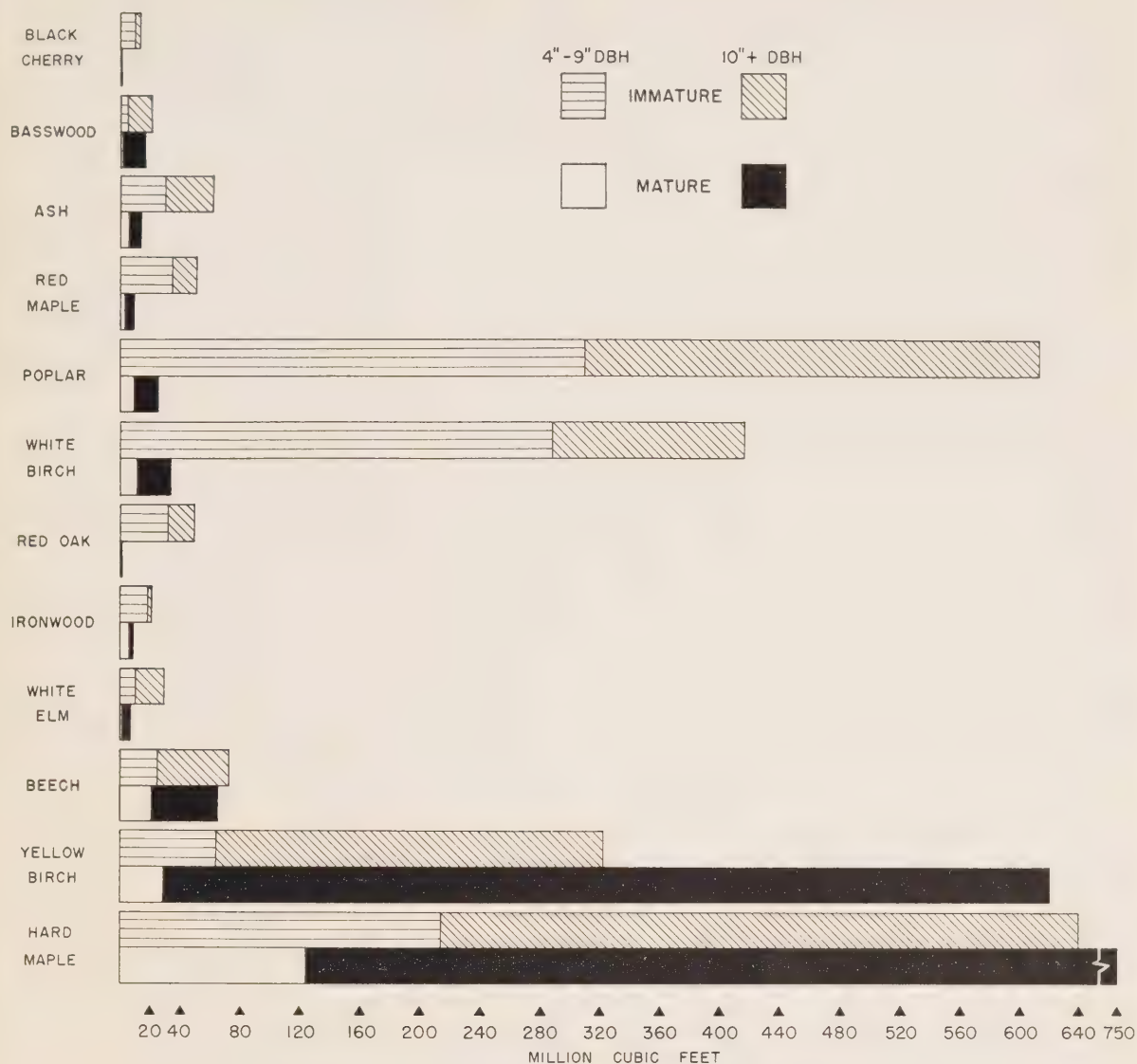


FIGURE 12

*Allowable Cut*

The calculations of the allowable cut have been carried out by means of a formula<sup>1</sup> using an appropriate rotation<sup>2</sup>. The amount of the annual allowable cut results directly from the volume of the primary growing stock and rotation age used for the different species encountered in the district. The present allowable cut figures, like the volume of the primary

growing stock, may be on areas which, at the moment, are inaccessible to operations. The allowable cut volumes may likewise be in stands which, due to low net yield, are economically inoperable. Taking these conditions into account, the computed allowable cut is regarded as potential rather than actually obtainable under present operating conditions.

Woods operations are being carried on each year and with present stands growing older, the size and structure of the primary growing stock will change.

<sup>1</sup> Methods of calculation of allowable cut are given in Appendix, methods, allowable cut, page 27.

<sup>2</sup> Rotation ages by species, table 14, page 26.

TABLE 6. — *Cubic-foot volumes of primary growing stock on productive forest land in the Algonquin district by species and age classes in two size classes.*

Species	Mature		Immature		Total productive forest
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	7,054	40,391	208,768	345,352	601,565
Red pine.....	2,576	3,080	73,046	98,623	177,325
Jack pine.....	9,185	12,872	57,009	34,775	113,841
White spruce.....	6,945	30,572	61,037	72,371	170,925
Black spruce.....	3,848	2,405	32,342	7,406	46,001
Balsam fir.....	23,400	5,661	165,631	18,957	213,649
Eastern hemlock.....	33,610	218,835	43,866	131,961	428,272
White cedar.....	9,560	18,903	34,085	29,849	92,397
Larch.....	23	127	2,926	284	3,360
<b>TOTAL CONIFERS.....</b>	<b>96,201</b>	<b>332,846</b>	<b>678,710</b>	<b>739,578</b>	<b>1,847,335</b>
Hard maple.....	123,995	625,177	214,493	424,272	1,387,937
Yellow birch.....	29,130	591,775	64,176	258,878	943,959
Beech.....	20,875	44,735	24,537	48,117	138,264
White elm.....	974	6,091	11,485	18,900	37,450
Ironwood.....	6,918	2,302	18,921	2,185	30,326
Red oak.....	744	873	32,226	17,521	51,364
White birch.....	11,216	22,427	288,047	129,287	450,977
Poplar (all).....	8,758	16,395	309,952	304,359	639,464
Red maple.....	3,009	5,584	34,712	16,794	60,099
Ash (black and white).....	5,509	8,369	30,405	31,220	75,503
Basswood.....	985	15,406	4,775	15,977	37,143
Black cherry.....	696	907	9,566	2,988	14,157
<b>TOTAL HARDWOODS.....</b>	<b>212,809</b>	<b>1,340,041</b>	<b>1,043,295</b>	<b>1,270,498</b>	<b>3,866,643</b>
<b>TOTAL ALL SPECIES.....</b>	<b>309,010</b>	<b>1,672,887</b>	<b>1,722,005</b>	<b>2,010,076</b>	<b>5,713,978</b>

The calculation of the allowable cut based on the present volume of the primary growing stock is of value for a period of about ten years. On expiration of the initial ten-year period the allowable cut should be calculated anew, based on the experience of the first ten-year period and in conformity with the actual performance of the forest. With effective forestry practices, allowable cuts for the more valuable species will tend, almost certainly, to increase; without improved forestry practices the present trend to more and more poplar and white birch at the expense of white and red pine will continue.

Patented lands are, on the average, being operated on a short rotation and in these circumstances the allowable cut for patented lands has been calculated on a shorter rotation than for Crown lands of the district.

The annual allowable cut, or net depletion allowable

TABLE 7. — *Cubic-foot volumes of primary growing stock on Crown lands in the Algonquin district by species and age class in two size classes.*

Species	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	6,730	39,023	173,091	285,625	504,469
Red pine.....	2,420	2,855	61,293	84,872	151,440
Jack pine.....	8,721	12,382	51,150	33,272	105,525
White spruce.....	6,697	29,337	49,717	59,028	144,779
Black spruce.....	3,431	2,113	27,011	6,153	38,708
Balsam fir.....	22,332	5,349	131,721	14,582	173,984
Eastern hemlock.....	32,057	209,892	32,270	100,317	374,536
White cedar.....	9,042	17,969	24,551	21,774	73,336
Larch.....	17	126	1,896	184	2,223
<b>TOTAL CONIFERS.....</b>	<b>91,447</b>	<b>319,046</b>	<b>552,700</b>	<b>605,807</b>	<b>1,569,000</b>
Hard maple.....	116,781	590,297	164,758	326,874	1,198,710
Yellow birch.....	27,891	566,294	50,225	201,802	846,212
Beech.....	19,737	41,822	18,981	35,964	116,504
White elm.....	768	4,760	8,735	14,170	28,433
Ironwood.....	6,420	2,137	14,382	1,651	24,590
Red oak.....	722	847	27,024	13,700	42,293
White birch.....	10,949	21,962	246,368	109,094	388,373
Poplar (all).....	8,491	15,916	262,747	257,651	544,805
Red maple.....	2,663	4,800	24,861	11,260	43,584
Ash (black and white).....	5,158	7,895	24,075	24,852	61,980
Basswood.....	881	13,930	3,458	12,013	30,282
Black cherry.....	513	667	7,130	2,223	10,533
<b>TOTAL HARDWOODS.....</b>	<b>200,974</b>	<b>1,271,327</b>	<b>852,744</b>	<b>1,011,254</b>	<b>3,336,299</b>
<b>TOTAL ALL SPECIES.....</b>	<b>292,421</b>	<b>1,590,373</b>	<b>1,405,444</b>	<b>1,617,061</b>	<b>4,905,299</b>

under management in the Algonquin district, is 56,385,170 cubic feet, 34,920,915 cubic feet from Crown lands and 21,464,255 cubic feet from patented lands. Of the total allowable cut, 62 per cent is on Crown lands and 38 per cent on patented lands.

#### CROWN LAND

The annual allowable cut for Crown land represents 0.7 per cent of the primary growing stock, made up mostly of immature timber, or 16 cubic feet per acre of the productive forest area. Of the total allowable cut, 7,177,735 cubic feet or 21 per cent is coniferous species and 27,743,180 cubic feet or 79 per cent is of hardwood species. Since the rotation is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 0.5 per cent of the coniferous primary growing stock and 0.8 per cent for the hardwoods.

TABLE 8.—Cubic-foot volumes of primary growing stock on patented lands in the Algonquin district by species and age class in two size classes.

Species	Mature		Immature		Total patented lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	324	1,368	35,677	59,727	97,096
Red pine.....	156	225	11,753	13,751	25,885
Jack pine.....	464	490	5,859	1,503	8,316
White spruce.....	248	1,235	11,320	13,343	26,146
Black spruce.....	417	292	5,331	1,253	7,293
Balsam fir.....	1,068	312	33,910	4,375	39,665
Eastern hemlock.....	1,553	8,943	11,596	31,644	53,736
White cedar.....	518	934	9,534	8,075	19,061
Larch.....	6	1	1,030	100	1,137
<b>TOTAL CONIFERS.....</b>	<b>4,754</b>	<b>13,800</b>	<b>126,010</b>	<b>133,771</b>	<b>278,335</b>
Hard maple.....	7,214	34,880	49,735	97,398	189,227
Yellow birch.....	1,239	25,481	13,951	57,076	97,747
Beech.....	1,138	2,913	5,556	12,153	21,760
White elm.....	206	1,331	2,750	4,730	9,017
Ironwood.....	498	165	4,539	534	5,736
Red oak.....	22	26	5,202	3,821	9,071
White birch.....	267	465	41,679	20,193	62,604
Poplar (all).....	267	479	47,205	46,708	94,659
Red maple.....	346	784	9,851	5,534	16,515
Ash (black and white).....	351	474	6,330	6,368	13,523
Basswood.....	104	1,476	1,317	3,964	6,861
Black cherry.....	183	240	2,436	765	3,624
<b>TOTAL HARDWOODS.....</b>	<b>11,835</b>	<b>68,714</b>	<b>190,551</b>	<b>259,244</b>	<b>530,344</b>
<b>TOTAL ALL SPECIES.....</b>	<b>16,589</b>	<b>82,514</b>	<b>316,561</b>	<b>393,015</b>	<b>808,679</b>

The annual allowable cut for the species making up the coniferous content (table 9) shows that 34 per cent is hemlock, 18 per cent white and red pine, 17 per cent white and black spruce, 13 per cent balsam, 13 per cent jack pine and 5 per cent cedar. Larch appears in an inappreciable quantity. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock by species is shown graphically, figure 13.

The species making up the hardwood content (table 10) shows that 43 per cent is yellow birch and another 38 per cent is hard maple, contributing together over 80 per cent of allowable cut for hardwoods. Other hardwoods appear in insignificant volumes. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 14.

TABLE 9.—Annual allowable cut for coniferous species on Crown lands in the Algonquin district.

Species	Annual allowable cut cu. ft.
White pine	1,143,825
Red pine.....	158,255
Jack pine.....	904,420
White spruce.....	1,081,010
Black spruce.....	138,600
Balsam fir.....	922,705
Hemlock.....	2,419,490
White cedar.....	405,160
Larch	4,270
<b>TOTAL CONIFERS.....</b>	<b>7,177,735</b>

TABLE 10.—Annual allowable cut for hardwood species on Crown lands.

Species	Annual allowable cut cu. ft.
Hard maple	10,606,170
Yellow birch...	11,883,700
Beech	923,385
White elm....	110,560
Ironwood	256,695
Red oak	23,540
White birch	1,234,170
Poplar (all)	1,464,425
Red maple	319,845
Ash, white and black	391,580
Basswood.....	493,705
Black cherry	35,405
<b>TOTAL HARDWOODS</b>	<b>27,743,180</b>

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 21,464,255 cubic feet, which represents 2.7 per cent of the primary growing stock made up mostly of immature stands, or about 55 cubic feet

TABLE 11.—Annual allowable cut for all species on patented lands.

Species	Annual allowable cut cu. ft.
White pine	2,022,825
Red pine.....	808,915
Jack pine.....	389,830
White spruce.....	817,070
Black spruce..	151,935
Balsam fir.....	1,239,540
Hemlock	671,700
Cedar	357,390
Larch	28,410
<b>TOTAL CONIFERS</b>	<b>6,487,615</b>
Hard maple..	3,548,005
Yellow birch....	1,527,300
Beech	272,000
Elm	169,065
Ironwood.	107,545
Red oak	170,075
White birch	1,956,390
Poplar.....	5,916,225
Red maple	774,125
Ash	253,550
Basswood...	214,400
Black cherry	67,960
<b>TOTAL HARDWOODS</b>	<b>14,976,640</b>



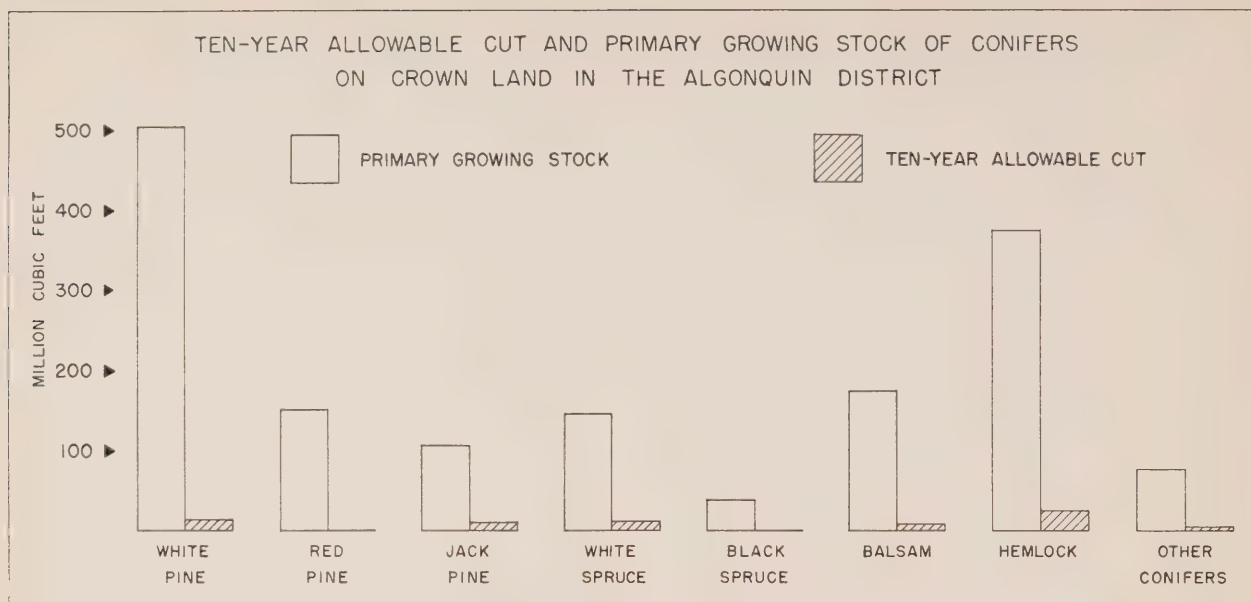


FIGURE 13

per acre of the productive forest land. The annual allowable cut on patented lands is 2.3 per cent of the primary growing stock for conifers and 2.8 per cent for hardwoods (table 11).

The annual allowable cut for coniferous species on patented lands is 6,487,615 cubic feet and for hardwoods, 14,976,640 cubic feet, made up mostly

of hard maple, yellow birch, white birch and poplar, which together contribute 12,947,920 cubic feet, or almost two-thirds, to the total allowable cut. For the coniferous species, white and red pine are most important, contributing about 2.8 million cubic feet. Balsam fir is next in importance, followed by white spruce, hemlock, jack pine and others (figs. 15 and 16).

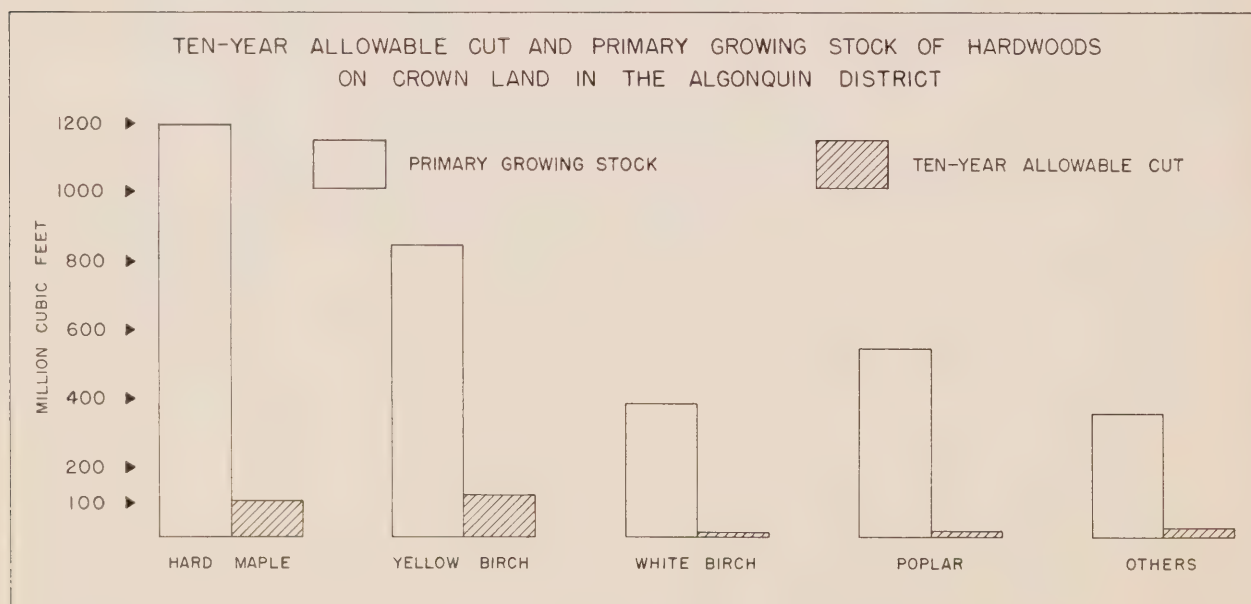


FIGURE 14

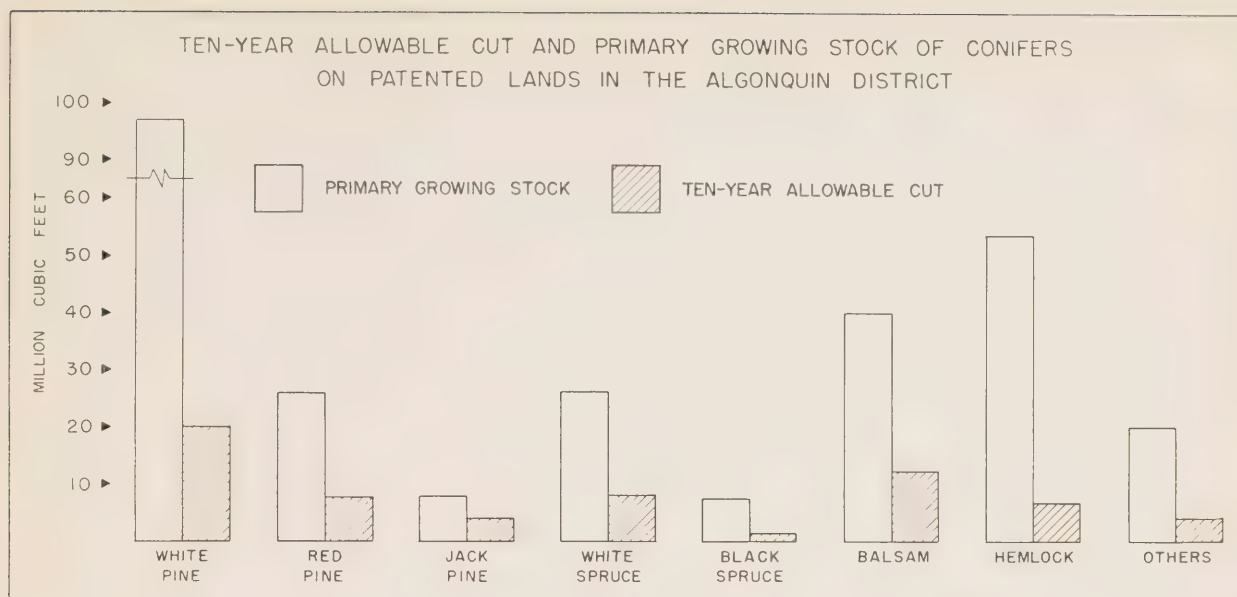


FIGURE 15

#### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Return for the period 1946-1949<sup>1</sup>, inclusive, the average amounts of wood and forest products were cut annually on Crown lands in the Algonquin district as follows:

Logs and booms.....	28,363,075 F.B.M. Doyle rule
Posts and poles.....	37,388 pieces
Ties.....	145 pieces
Pulpwood.....	11,755 cords
Fuelwood.....	2,891 cords
Pit props.....	696 cords
Spoolwood.....	284 cords
Shingle bolts.....	102 cords

TABLE 12. — Gross total cubic volume of wood utilized annually in the Algonquin district on Crown lands.

Species	Wood utilized cu. ft.	Total per cent
Pine, white and red.....	4,859,050	27.5
Jack pine.....	2,885,927	16.4
Spruce, white and black.....	1,519,471	8.6
Balsam fir.....	243,000	1.4
Hemlock.....	2,522,495	14.3
Cedar and larch.....	24,915	.1
<b>TOTAL CONIFERS.....</b>	<b>12,054,858</b>	<b>68.3</b>
Hard maple.....	1,334,850	7.6
Birch, yellow and white.....	1,864,305	10.6
Poplar.....	2,245,925	12.7
Other hardwoods.....	144,610	.8
<b>TOTAL HARDWOODS.....</b>	<b>5,589,690</b>	<b>31.7</b>
<b>TOTAL</b>	<b>17,644,548</b>	

<sup>1</sup> Reports of the Minister of Lands and Forests for the Province of Ontario, for the fiscal years 1947-1950.

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet and are comparable with the figures for allowable cut (table 12).



Stand of white and red pine thinned and brush lopped in foreground with unthinned forest in background.

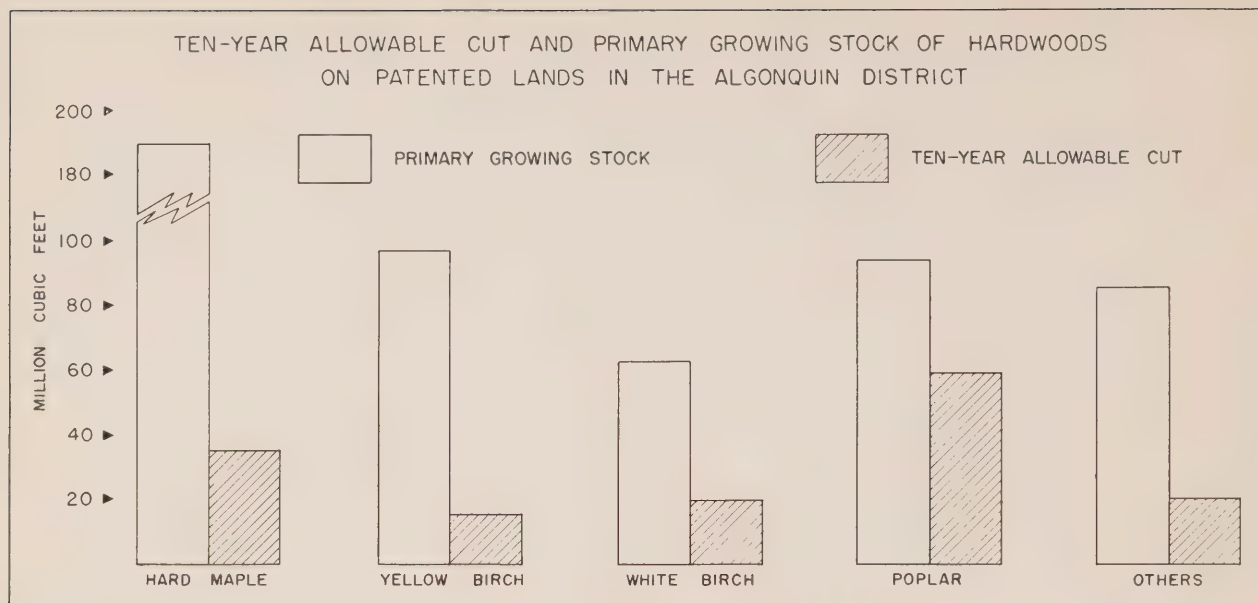


FIGURE 16

A comparison of the annual allowable cut with the actual cut by species (table 13) indicates a considerable overcut of coniferous species, while utilization of hardwoods was less than the allowable cut (fig. 17). This comparison indicates that white and red pine were actually cut about four times the

allowable cut and jack pine three times. If these species are to be cut at the present rate, then the existing mature timber will be exhausted within the next seven to nine years. Spruces and hemlock were cut slightly over their allowable cut; balsam fir, cedar and larch far below the allowable cut. The

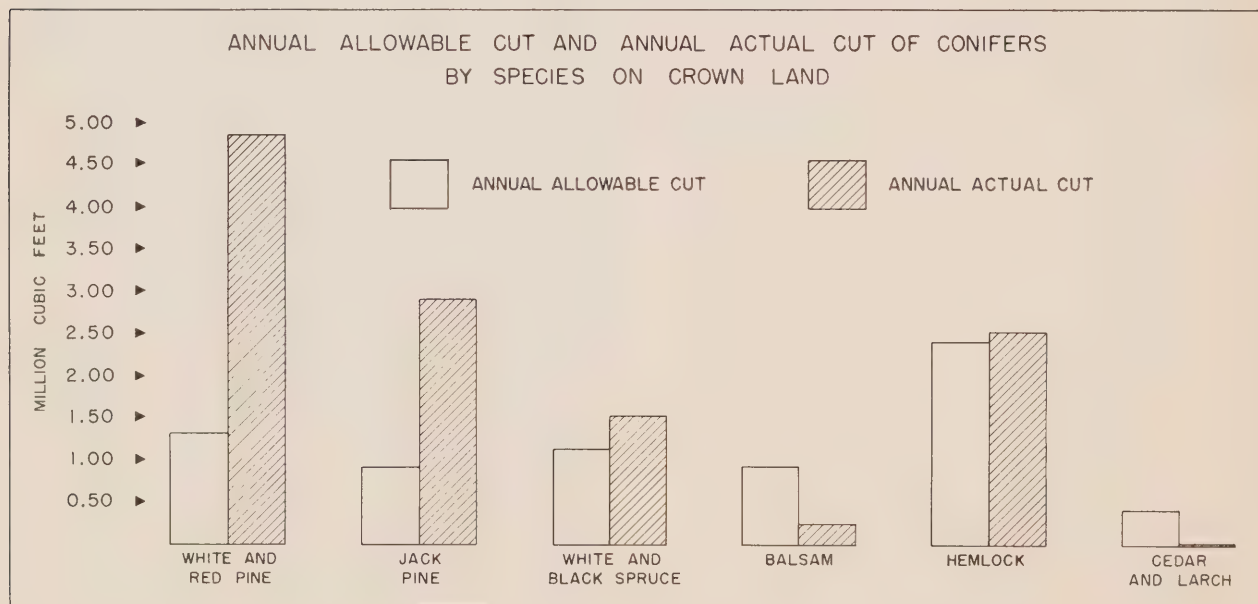


FIGURE 17



cut of hardwoods was only 20 per cent of the allowable cut. Excessive volumes of hard maple and birch remain almost unutilized on Crown lands in the Algonquin district (fig. 18).

TABLE 13. — Comparison of allowable cut with actual utilization by species, Crown lands.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red.....	1,302	4,859
Jack pine.....	904	2,886
Spruce, white and black.....	1,220	1,519
Balsam fir.....	923	243
Hemlock.....	2,420	2,523
Cedar and larch.....	409	25
<b>TOTAL CONIFERS.....</b>	<b>7,178</b>	<b>12,055</b>
Hard maple.....	10,606	1,335
Birch, yellow and white.....	13,118	1,864
Poplar.....	1,464	2,246
Other hardwoods.....	2,555	145
<b>TOTAL HARDWOODS.....</b>	<b>27,743</b>	<b>5,590</b>
<b>TOTAL.....</b>	<b>34,921</b>	<b>17,645</b>

There are no available records of the quantity of timber utilized from patented lands in the Algonquin district and, consequently, no comparison of the allowable with the annual actual cut is made.

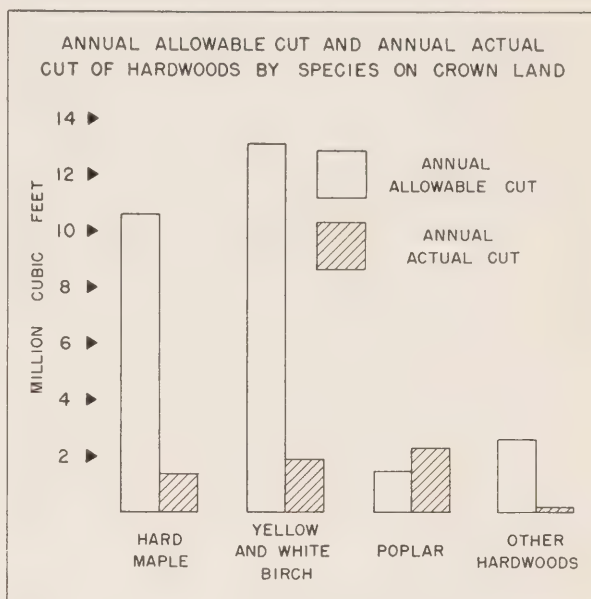


FIGURE 18

Common and Botanical Names of Tree Species  
included in Timber Estimates

CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill.) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
Hemlock.....	<i>Tsuga canadensis</i> (L.) Carr.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

HARDWOODS

Hard maple.....	<i>Acer saccharum</i> Marsh.
-----------------	------------------------------

Yellow birch.....	<i>Betula lutea</i> Michx. f.
Beech.....	<i>Fagus grandifolia</i> Ehrh.
White elm.....	<i>Ulmus americana</i> L.
Ironwood.....	<i>Ostrya virginiana</i> (Mill.) K. Koch.
Red oak.....	<i>Quercus borealis</i> Michx. f.
Red maple.....	<i>Acer rubrum</i> L.
White ash.....	<i>Fraxinus americana</i> L.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
Basswood.....	<i>Tilia glabra</i> Vent.
Black cherry.....	<i>Prunus serotina</i> Ehrh.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.

# APPENDIX

## Survey Methods

● The forest resources inventory of the Algonquin district was compiled from data collected during the summers of 1949 and 1950 together with the separate inventory of the thousand square mile area known as the Petawawa Management Unit. No company inventory was used in calculating this district inventory.

Vertical air photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal-length camera to produce photographs on a scale of four inches to the mile (1/15,840). These photographs were taken during the summers of 1946 and 1948 and any alterations or changes in the forests of the district occurring after the date of photography are not incorporated in this report.

Following the photography, planimetric base maps on a scale of four inches to the mile were prepared by the Slotted Templet method. Forest type maps were prepared by direct photographic interpretation using stereoscopic pairs of photographs and transferring directly to the base maps.

Field sampling was carried out by crews who collected all the data necessary for the making of the volume estimates. The field samples aided in photo interpretation and on completion of the forest type map, areas of all land and water were computed according to the accepted classification.

Volume estimates were prepared for type aggregates. For this purpose the forest area was classified into three broad cover types: coniferous, hardwood and mixedwood. These were separated into two age classes: mature and immature. The volume per acre for each cover type in both the mature and immature age classes was then summarized into four crown density classes. These summaries apply only to that portion of the Algonquin ecological section covered in the years that the field work was done. These stock tables 16 and 17 are made up in this manner and are used in the final total volume computations.

After forest type maps and final inventory summaries showing total wood volume by classified areas is compiled, all is incorporated into this report.

## Mean Annual Increment

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the respective rotation age. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 20 cubic feet per acre and for patented lands, 30 cubic feet per acre. The average for the whole district is 20 cubic feet per acre.

## Age Classes

The age classes, in their present form, do not permit of the usual method of arriving at sustained yield, because there is no figure for area by species. No normal area for the separate age classes can be arrived at due to the broad age range found in both the mature (30 to 300 years) and immature (10 to 150 years) age classes, depending on species.

## Rotation

In view of the absence of local studies on maturity of stands, the mature age class figures shown in Class Ib<sup>1</sup> were used as rotation ages for all species encountered, except jack pine where a rotation age of seventy years was considered more suitable. In addition to these a rotation age of one hundred years for ash, ironwood and black cherry has been adopted arbitrarily (table 14).

In calculations of allowable cut a higher rotation for Crown land was used than that for patented land. The adoption of the lower rotation in the case

TABLE 14. — *Rotation ages by species on Crown and patented land.*

Species	Crown land	Patented land
	years	years
White pine.....	120	90
Red pine.....	100	60
Jack pine.....	70	40
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
Eastern hemlock.....	300	150
White cedar.....	200	100
Larch.....	100	75
Hard maple.....	200	100
Yellow birch.....	150	120
Beech.....	200	150
White elm.....	150	100
Ironwood.....	100	100
Red oak.....	200	100
White birch.....	80	60
Poplar (all).....	50	30
Red maple.....	70	40
Ash.....	100	100
Basswood.....	90	60
Black cherry.....	100	100

<sup>1</sup> Manual of Timber Management, Ontario Department of Lands and Forests — Part II, page 50.

of patented land has been explained under "Allowable Cut" in the body of this report.

### *Allowable Cut*

#### (a) METHOD

The following two bases were available for calculation of allowable cut: 1. the volume of the mature and immature age classes for each species, and 2. the adopted rotations.

The compilation was carried out in such a way that the volumes were shown by species, separately rather than for the total growing stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory for the following reasons: 1. the ratio of the volume per acre of the mature to immature age class actually has been found, so far in Ontario, to be approximately 5/3 required by the French method; 2. in compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same; 3. the French method is recognized as sound enough, though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

#### (b) FORMULA

In the present calculations the following formulae were used:

$$(1) \text{ Crown lands: } P = \frac{V.1.}{n/3}$$

$$(2) \text{ Patented lands: } P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I)  
V.2. — denotes volume of immature timber (Age Class II)  
n — denotes rotation.  
P — denotes annual allowable cut.

The decision to use formula (1) for Crown lands was made for the following reasons: The area of mature stands in the Algonquin district is 27 per cent of productive forest area. The immature age class shows a considerable surplus in area, but it contains stands, the bulk of which will become mature not earlier than at least in a period equal to approximately one-third of rotation. Therefore, the presently mature stock can be used up gradually only within the said period of one-third of rotation

during which new mature timber will appear on the area and will become ready for utilization. In view of the foregoing, a continuous utilization is set forth whereby only mature timber will be cut inasmuch as it is in accordance with the policy of the Ontario Government to limit utilization on Crown lands to mature timber only. Therefore, formula (1) was used in calculation of allowable cut for Crown lands.

The patented lands call for a different approach in solving the problem of regulating yield, and formula (2) was found satisfactory. Mature stands appear on patented lands on about 8 per cent of productive forest area, and the immature stands on 84 per cent of the area. With this fact in view, as well as with the heavy demand on wood in a densely populated area, it is certain that this considerable need for wood will be met in no other way than by cutting a portion of the immature stands. For that reason both the mature and immature volumes were included in the calculations of allowable cut for patented lands with the view to obtaining a balanced yield over a period of approximately two-thirds rotation.

With the aid of the said formulae, the allowable cut has been calculated for each species separately, with full consideration of the actual growing stock of each species and the appropriate rotation.

The results of individual calculations for each species have been totalled and shown as allowable cut for Crown lands and for patented lands, respectively.

### *Cull Factors*

The cull factors used in this report where it was found necessary to calculate the volume of the primary growing stock when merchantable volumes only were given in the annual timber returns, were taken from the figures for defect made available from operations being carried out in the district and surrounding areas (table 15)

TABLE 15. — *Cull factors by species, Algonquin district*

Species	Cull per cent
Pine, white and red	27.5
Jack pine...	35.0
Spruce...	20.0
Balsam fir...	65.0
Hemlock.....	50.0
Cedar.	35.0
Larch	35.0
Hard maple	35.0
Birch...	10.0
Beech	50.0
Elm.	50.0
Oak	50.0
Poplar	20.0
Ash	30.0
Basswood	50.0
Black cherry	50.0

<sup>1</sup> Le traité pratique d'aménagement des forêts. — L. Paré, 1930, Paris.



TABLE 16. — *Volume of the primary growing stock in cubic feet per acre.*  
*Algonquin Section — 1949*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	113.3	96.5	65.2	25.7	404.6	353.1	247.2	97.0
	10'' up	426.2	363.1	245.5	96.5	660.1	576.1	403.3	158.2
Red pine.....	4''-9''	99.4	84.6	57.2	22.5	230.0	200.7	140.5	55.1
	10'' up	162.1	138.1	93.4	36.7	195.9	171.0	119.7	47.0
Jack pine.....	4''-9''	164.3	140.0	94.6	37.2	132.3	115.5	80.9	31.7
	10'' up	292.2	248.9	168.3	66.2	16.4	14.3	10.0	3.9
White spruce.....	4''-9''	52.9	45.0	30.4	12.0	119.0	103.8	72.7	28.5
	10'' up	353.8	301.4	203.8	80.1	151.4	132.2	92.5	36.3
Black spruce.....	4''-9''	259.0	220.6	149.1	58.6	89.8	78.4	54.9	21.5
	10'' up	64.7	55.1	37.3	14.7	18.4	16.0	11.2	4.4
Balsam fir.....	4''-9''	102.3	87.1	58.9	23.2	270.3	236.0	165.1	64.8
	10'' up	80.3	68.4	46.3	18.2	44.0	38.4	26.9	10.5
Hemlock.....	4''-9''	94.5	80.5	54.4	21.4	39.9	34.8	24.4	9.6
	10'' up	764.6	651.2	440.3	173.2	159.5	139.3	97.4	38.2
White cedar.....	4''-9''	225.1	191.8	129.6	51.0	142.0	123.9	86.7	34.0
	10'' up	418.1	356.1	240.8	94.7	111.5	97.3	68.2	26.8
Larch.....	4''-9''	.....	.....	.....	.....	33.9	29.5	20.7	8.1
	10'' up	.....	.....	.....	.....	3.3	2.9	2.0	0.8
TOTAL CONIFERS.....	4''-9''	1110.8	946.1	639.4	251.6	1461.8	1275.7	893.1	350.3
	10'' up	2562.0	2182.3	1475.7	580.3	1360.5	1187.5	831.2	326.1
Hard maple.....	4''-9''	13.7	11.7	7.9	3.1	13.2	11.5	8.0	3.2
	10'' up	77.6	66.1	44.7	17.6	20.6	18.0	12.6	4.9
Yellow birch.....	4''-9''	40.3	34.4	23.2	9.1	24.3	21.2	14.9	5.8
	10'' up	183.8	156.5	105.8	41.6	127.8	111.6	78.0	30.6
Beech.....	4''-9''	4.5	3.8	2.6	1.0	.....	.....	.....	.....
	10'' up	3.8	3.3	2.2	0.9	.....	.....	.....	.....
White elm.....	4''-9''	.....	.....	.....	.....	2.4	2.1	1.4	0.6
	10'' up	.....	.....	.....	.....	4.4	3.8	2.7	1.0
Red oak.....	4''-9''	.....	.....	.....	.....	12.1	10.5	7.4	2.9
	10'' up	.....	.....	.....	.....	11.6	10.1	7.1	2.8
White birch.....	4''-9''	12.8	10.9	7.4	2.9	84.7	74.0	51.8	20.3
	10'' up	3.8	3.2	2.2	0.9	43.7	38.1	26.7	10.5
Poplar (all).....	4''-9''	44.8	38.2	25.8	10.2	57.5	50.2	35.2	13.8
	10'' up	50.6	43.1	29.2	11.4	98.0	85.5	59.8	23.4
Red maple.....	4''-9''	.....	.....	.....	.....	22.7	19.8	13.9	5.5
	10'' up	.....	.....	.....	.....	4.3	3.8	2.6	1.0
Black ash.....	4''-9''	15.8	13.5	9.1	3.6	12.8	11.2	7.8	3.1
	10'' up	25.7	21.9	14.8	5.8	17.6	15.4	10.8	4.2
TOTAL HARDWOODS.....	4''-9''	131.9	112.5	76.0	29.9	229.7	200.5	140.4	55.2
	10'' up	345.3	294.1	198.9	78.2	328.0	286.3	200.3	78.4
GRAND TOTAL.....	4''-9''	1242.7	1058.6	715.4	281.5	1691.5	1476.2	1033.5	405.5
	10'' up	2907.3	2476.4	1674.6	658.5	1688.5	1473.8	1031.5	404.5
TOTAL 4'' UP.....		4150.0	3535.0	2390.0	940.0	3380.0	2950.0	2065.0	810.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	.....	.....	.....	.....	12.2	11.1	8.6	.....
	10'' up	.....	.....	.....	.....	34.9	31.6	24.6	.....
White spruce.....	4''-9''	3.8	3.8	3.6	.....	6.8	6.2	4.8	3.3
	10'' up	20.1	19.8	18.7	.....	9.8	8.9	6.9	.....
Balsam fir.....	4''-9''	14.9	14.6	13.8	6.6	33.0	29.9	23.3	22.6
	10'' up	2.2	2.2	2.1	.....	5.8	5.3	4.1	16.4
Hemlock.....	4''-9''	18.0	17.8	16.8	.....	11.8	10.7	8.3	2.8
	10'' up	94.5	93.2	88.5	.....	57.4	52.1	40.6	17.1
White cedar.....	4''-9''	2.8	2.7	2.6	.....	.....	.....	.....	.....
	10'' up	7.4	7.4	7.0	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	39.5	38.9	36.8	6.6	63.8	57.9	45.0	28.7
	10'' up	124.2	122.6	116.3	.....	107.9	97.9	76.2	33.5
Hard maple.....	4''-9''	311.5	307.3	291.4	84.3	402.4	364.9	284.0	91.4
	10'' up	1635.6	1613.5	1530.1	563.9	855.2	775.5	603.6	479.7
Yellow birch.....	4''-9''	45.0	44.4	42.1	45.8	80.9	73.3	57.1	4.5
	10'' up	1080.3	1065.7	1010.6	1480.6	323.5	293.4	228.3	17.9
Beech.....	4''-9''	47.3	46.6	44.2	.....	45.7	41.4	32.3	.....
	10'' up	95.9	94.7	89.8	.....	92.8	84.2	65.5	.....
White elm.....	4''-9''	0.5	0.5	0.5	.....	17.3	15.7	12.2	18.1
	10'' up	2.9	2.9	2.7	.....	27.0	24.5	19.1	94.8
Ironwood.....	4''-9''	15.6	15.4	14.5	.....	37.0	33.6	26.1	.....
	10'' up	4.9	4.8	4.6	.....	4.6	4.1	3.2	.....

TABLE 16 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Red oak.....	4''-9''	.....	.....	.....	.....	24.8	22.5	17.5	7.5
	10'' up	.....	.....	.....	.....	14.0	12.7	9.9	.....
White birch.....	4''-9''	.....	.....	.....	.....	126.3	114.5	89.2	.....
	10'' up	.....	.....	.....	.....	84.2	76.4	59.4	.....
Poplar (all).....	4''-9''	.....	.....	.....	.....	213.0	193.1	150.3	.....
	10'' up	.....	.....	.....	.....	130.5	118.4	92.1	.....
Red maple.....	4''-9''	.....	.....	.....	.....	22.3	20.1	15.7	.....
	10'' up	.....	.....	.....	.....	8.2	7.5	5.8	.....
Black ash.....	4''-9''	.....	.....	.....	.....	10.9	9.8	7.6	1.6
	10'' up	.....	.....	.....	.....	11.3	10.3	8.0	15.8
Basswood.....	4''-9''	0.7	0.7	0.7	.....	7.5	6.8	5.3	.....
	10'' up	6.1	6.0	5.7	.....	34.0	30.9	24.0	.....
Black cherry.....	4''-9''	.....	.....	.....	8.8	18.9	17.2	13.4	23.4
	10'' up	.....	.....	.....	.....	6.0	5.4	4.2	13.1
TOTAL HARDWOODS.....	4''-9''	420.6	414.9	393.4	138.9	1007.0	912.9	710.7	146.5
	10'' up	2825.7	2787.6	2643.5	2044.5	1591.3	1443.3	1123.1	621.3
GRAND TOTAL.....	4''-9''	460.1	453.8	430.5	145.5	1070.8	970.8	755.7	175.2
	10'' up	2949.9	2910.2	2759.8	2044.5	1699.2	1541.2	1199.3	654.8
TOTAL 4'' UP.....		3410.0	3364.0	3190.0	2190.0	2770.0	2512.0	1955.0	830.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	14.2	12.7	9.7	4.4	177.8	165.1	130.4	52.1
	10'' up	114.8	103.0	78.6	35.5	266.8	247.6	195.6	46.2
Red pine.....	4''-9''	.....	.....	.....	.....	38.8	36.0	28.4	6.7
	10'' up	.....	.....	.....	.....	60.6	56.3	44.5	26.8
White spruce.....	4''-9''	25.7	23.0	17.6	8.0	64.4	59.8	47.2	6.5
	10'' up	86.1	77.2	59.0	26.6	64.3	59.7	47.2	.....
Black spruce.....	4''-9''	.....	.....	.....	.....	18.7	17.4	13.8	.....
	10'' up	.....	.....	.....	.....	4.7	4.3	3.4	.....
Balsam fir.....	4''-9''	90.3	81.0	61.8	27.9	186.4	172.9	136.7	60.5
	10'' up	17.2	15.4	11.8	5.3	18.4	17.1	13.5	.....
Hemlock.....	4''-9''	142.0	127.3	97.2	43.9	53.2	49.4	39.1	34.0
	10'' up	950.2	851.9	650.8	293.9	151.6	140.6	111.1	178.8
White cedar.....	4''-9''	40.9	36.7	28.1	12.6	40.3	37.4	29.5	.....
	10'' up	79.5	71.2	54.4	24.6	38.7	35.9	28.4	.....
TOTAL CONIFERS.....	4''-9''	313.1	280.7	214.4	96.8	579.6	538.0	425.1	159.8
	10'' up	1247.8	1118.7	854.6	385.9	605.1	561.5	443.7	251.8
Hard maple.....	4''-9''	119.9	107.5	82.1	37.1	104.4	96.9	76.6	54.9
	10'' up	585.3	524.7	400.9	181.0	202.7	188.2	148.6	288.5
Yellow birch.....	4''-9''	78.9	70.7	54.0	24.4	55.7	51.7	40.8	6.3
	10'' up	1499.2	1344.1	1026.8	463.7	271.9	252.4	199.4	120.0
Beech.....	4''-9''	18.4	16.5	12.6	5.7	8.4	7.8	6.2	.....
	10'' up	37.5	33.6	25.7	11.6	9.1	8.5	6.7	.....
White elm.....	4''-9''	.....	.....	.....	.....	8.4	7.8	6.2	.....
	10'' up	.....	.....	.....	.....	9.1	8.5	6.7	.....
Ironwood.....	4''-9''	9.3	8.4	6.3	2.9	10.6	9.9	7.8	.....
	10'' up	3.6	3.2	2.5	1.1	1.1	1.0	0.8	.....
Red oak.....	4''-9''	.....	.....	.....	.....	12.9	12.0	9.4	.....
	10'' up	.....	.....	.....	.....	7.6	7.0	5.6	.....
White birch.....	4''-9''	36.1	32.4	24.7	11.2	270.5	251.1	198.4	6.5
	10'' up	114.4	102.5	78.4	35.4	127.3	118.1	93.3	.....
Poplar (all).....	4''-9''	31.9	28.5	21.8	9.9	235.6	218.7	172.8	49.8
	10'' up	49.8	44.7	34.2	15.4	288.0	267.3	211.2	88.4
Red maple.....	4''-9''	9.8	8.8	6.7	3.0	30.0	27.9	22.0	32.9
	10'' up	16.0	14.3	11.0	5.0	8.0	7.4	5.9	21.1
Black ash.....	4''-9''	25.5	22.8	17.4	7.9	30.3	28.1	22.2	.....
	10'' up	43.3	38.9	29.7	13.4	37.0	34.4	27.1	.....
Basswood.....	4''-9''	2.4	2.2	1.6	0.7	2.2	2.0	1.6	.....
	10'' up	57.8	51.8	39.6	17.9	6.6	6.1	4.8	.....
Black cherry.....	4''-9''	.....	.....	.....	.....	2.5	2.3	1.8	.....
	10'' up	.....	.....	.....	.....	0.4	0.4	0.3	.....
TOTAL HARDWOODS.....	4''-9''	332.2	297.8	227.2	102.8	771.5	716.2	565.8	150.4
	10'' up	2406.9	2157.8	1648.8	744.5	968.8	899.3	710.4	518.0
GRAND TOTAL.....	4''-9''	645.3	578.5	441.6	199.6	1351.1	1254.2	990.9	310.2
	10'' up	3654.7	3276.5	2503.4	1130.4	1573.9	1460.8	1154.1	769.8
TOTAL 4'' UP.....		4300.0	3855.0	2945.0	1330.0	2925.0	2715.0	2145.0	1080.0

TABLE 17. — Volume of the primary growing stock in cubic feet per acre.  
Algonquin Section — 1950

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	59.4	56.3	44.4	18.6	178.4	166.6	119.1	21.3
	10'' up	144.1	136.5	107.2	45.1	404.7	378.0	270.0	97.9
Red pine.....	4''-9''	18.0	17.1	13.4	5.6	2.4	2.2	1.6	2.4
	10'' up	.....	.....	.....	.....	11.2	10.5	7.5	10.1
Jack pine.....	4''-9''	277.4	262.9	206.4	86.8	93.1	87.0	62.1	379.3
	10'' up	72.9	69.1	54.2	22.8	6.7	6.2	4.5	45.0
White spruce.....	4''-9''	35.0	33.2	26.0	10.9	55.6	51.9	37.1	.....
	10'' up	26.8	25.4	20.0	8.4	91.9	85.8	61.3	.....
Black spruce.....	4''-9''	109.4	103.7	81.4	34.2	74.3	69.3	49.6	.....
	10'' up	202.3	191.7	150.4	63.3	25.5	23.9	17.0	.....
Balsam fir.....	4''-9''	102.1	96.7	75.9	31.9	271.0	253.1	180.8	.....
	10'' up	62.8	59.5	46.7	19.7	37.6	35.2	25.1	.....
Hemlock.....	4''-9''	116.7	110.6	86.8	36.5	134.9	126.0	90.0	.....
	10'' up	249.1	236.0	185.3	78.0	166.9	155.9	111.4	.....
White cedar.....	4''-9''	106.1	100.5	78.9	33.2	162.0	151.2	108.1	.....
	10'' up	82.0	77.7	61.0	25.6	126.2	117.9	84.2	.....
Larch.....	4''-9''	7.7	7.3	5.7	2.4	.....	.....	.....	3.7
	10'' up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4''-9''	831.8	788.3	618.7	260.1	971.7	907.3	648.4	406.7
	10'' up	840.0	795.9	624.8	262.9	870.7	813.4	581.0	153.0
Hard maple.....	4''-9''	6.5	6.2	4.8	2.0	7.3	6.8	4.9	.....
	10'' up	253.7	240.3	188.7	79.4	6.3	5.9	4.2	.....
Yellow birch.....	4''-9''	11.5	10.9	8.6	3.6	31.9	29.7	21.3	.....
	10'' up	202.3	191.7	150.4	63.3	115.6	108.0	77.1	.....
White elm.....	4''-9''	.....	.....	.....	.....	.....	.....	.....	.....
	10'' up	154.6	146.5	115.0	48.4	.....	.....	.....	.....
White birch.....	4''-9''	2.7	2.6	2.0	0.9	39.0	36.4	26.0	14.1
	10'' up	25.6	24.3	19.1	8.0	42.7	39.9	28.5	5.9
Poplar (all).....	4''-9''	61.2	58.0	45.5	19.2	40.1	37.5	26.8	32.8
	10'' up	101.1	95.8	75.2	31.6	52.9	49.4	35.3	11.5
Red maple.....	4''-9''	29.3	27.7	21.8	9.1	30.4	28.4	20.3	.....
	10'' up	17.1	16.2	12.7	5.4	21.8	20.3	14.5	.....
B. & W. ash.....	4''-9''	27.5	26.1	20.4	8.6	19.9	18.6	13.3	.....
	10'' up	11.1	10.5	8.3	3.5	14.1	13.2	9.4	.....
Basswood.....	4''-9''	.....	.....	.....	.....	2.5	2.2	1.6	.....
	10'' up	.....	.....	.....	.....	2.1	2.0	1.4	.....
TOTAL HARDWOODS.....	4''-9''	138.7	131.5	103.1	43.4	171.1	159.6	114.2	46.9
	10'' up	765.5	725.3	569.4	239.6	255.5	238.7	170.4	17.4
GRAND TOTAL.....	4''-9''	970.5	919.8	721.8	303.5	1142.8	1066.9	762.6	453.6
	10'' up	1605.5	1521.2	1194.2	502.5	1126.2	1052.1	751.4	170.4
TOTAL 4'' UP.....		2576.0	2441.0	1916.0	806.0	2269.0	2119.0	1514.0	624.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	.....	.....	.....	.....	5.1	5.0	4.2	12.2
	10'' up	.....	.....	.....	.....	22.1	21.7	18.0	31.8
White spruce.....	4''-9''	1.3	1.2	1.0	0.5	1.2	1.1	1.0	.....
	10'' up	9.4	9.2	7.8	3.6	1.1	1.1	0.9	.....
Balsam fir.....	4''-9''	21.5	21.0	17.8	8.3	15.6	15.4	12.8	2.3
	10'' up	3.4	3.3	2.8	1.3	2.5	2.4	2.0	.....
Hemlock.....	4''-9''	31.7	30.9	26.3	12.2	21.8	21.3	17.8	4.3
	10'' up	146.3	142.6	121.2	56.6	57.6	56.5	47.1	15.4
TOTAL CONIFERS.....	4''-9''	54.5	53.1	45.1	21.0	43.7	42.8	35.8	18.8
	10'' up	159.1	155.1	131.8	61.5	83.3	81.7	68.0	47.2
Hard maple.....	4''-9''	332.6	324.2	275.5	128.5	407.2	399.3	332.7	50.8
	10'' up	1579.1	1539.2	1308.1	609.9	670.1	657.1	547.5	66.8
Yellow birch.....	4''-9''	39.0	38.0	32.3	15.1	57.1	56.0	46.6	9.9
	10'' up	911.5	888.5	755.1	352.0	158.4	155.3	129.4	7.6
Beech.....	4''-9''	52.3	51.0	43.3	20.2	53.0	52.0	43.4	.....
	10'' up	140.0	136.4	116.0	54.0	142.0	139.3	116.0	.....
White elm.....	4''-9''	11.2	10.9	9.3	4.3	20.4	20.0	16.7	7.6
	10'' up	67.1	65.4	55.6	26.0	36.3	35.6	29.6	.....
Hornbeam.....	4''-9''	24.2	23.6	20.1	9.4	36.1	35.4	29.6	15.2
	10'' up	7.8	7.6	6.5	3.0	4.7	4.6	3.8	.....
Red oak.....	4''-9''	.....	.....	.....	.....	29.5	29.0	24.1	27.7
	10'' up	.....	.....	.....	.....	27.2	26.6	22.2	20.9
White birch.....	4''-9''	.....	.....	.....	.....	55.2	54.2	45.1	64.1
	10'' up	.....	.....	.....	.....	19.6	19.2	16.0	14.8



TABLE 17 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Poplar (all).....	4''-9''					131.5	128.9	107.4	254.5
	10'' up					61.3	60.1	50.1	73.4
Red maple.....	4''-9''	12.9	12.6	10.7	5.0	60.2	59.1	49.2	23.5
	10'' up	37.0	36.0	30.6	14.3	41.9	41.0	34.2	21.3
Black ash.....	4''-9''	10.7	10.4	8.9	4.1	26.3	25.8	21.5	16.1
	10'' up	14.2	13.9	11.7	5.5	16.8	16.5	13.7	14.2
Basswood.....	4''-9''	5.6	5.4	4.6	2.1	17.3	16.9	14.1	
	10'' up	76.3	74.4	63.2	29.5	41.7	40.9	34.1	
Black cherry.....	4''-9''	10.7	10.5	8.9	4.1	20.7	20.3	16.9	4.6
	10'' up	14.2	13.8	11.7	5.5	6.5	6.4	5.3	
TOTAL HARDWOODS.....	4''-9''	499.2	486.6	413.6	192.8	914.5	896.9	747.3	474.0
	10'' up	2847.2	2775.2	2358.5	1099.7	1226.5	1202.6	1001.9	219.0
GRAND TOTAL.....	4''-9''	553.7	539.7	458.7	213.8	958.2	939.7	783.1	492.8
	10'' up	3006.3	2930.3	2490.3	1161.2	1309.8	1284.3	1069.9	266.2
TOTAL 4' UP.....		3560.0	3470.0	2949.0	1375.0	2268.0	2224.0	1853.0	759.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	4.0	3.8	2.8	1.1	115.9	97.9	64.9	33.3
	10'' up	24.2	22.8	17.0	6.8	253.1	213.9	141.7	164.7
Red pine.....	4''-9''					5.8	4.9	3.2	
	10'' up					3.2	2.7	1.8	18.5
Jack pine.....	4''-9''								46.7
	10'' up								
White spruce.....	4''-9''	12.3	11.6	8.6	3.4	34.2	28.9	19.2	1.2
	10'' up	88.5	83.4	62.1	24.8	55.8	47.1	31.2	
Black spruce.....	4''-9''	1.8	1.7	1.3	0.5				
	10'' up	22.4	21.1	15.7	6.3				
Balsam fir.....	4''-9''	79.2	74.6	55.6	22.2	182.7	154.4	102.4	1.2
	10'' up	13.5	12.8	9.5	3.8	33.3	28.1	18.6	
Hemlock.....	4''-9''	158.9	149.8	111.6	44.6	153.7	129.9	86.1	8.6
	10'' up	1017.9	959.8	714.8	285.4	266.3	225.0	149.1	28.9
White cedar.....	4''-9''	23.5	22.2	16.5	6.6	36.8	31.1	20.6	
	10'' up	65.2	61.4	45.8	18.3	29.2	24.7	16.4	
TOTAL CONIFERS.....	4''-9''	279.7	263.7	196.4	78.4	529.1	447.1	296.4	91.0
	10'' up	1231.7	1161.3	864.9	345.4	640.9	541.5	358.8	212.1
Hard maple.....	4''-9''	169.1	159.4	118.7	47.4	124.8	105.5	69.9	11.6
	10'' up	874.7	824.8	614.3	245.3	259.2	219.0	145.1	70.8
Yellow birch.....	4''-9''	69.8	65.8	49.0	19.6	89.5	75.6	50.1	
	10'' up	1155.3	1089.4	811.3	323.9	330.5	279.3	185.1	7.4
Beech.....	4''-9''	13.3	12.5	9.3	3.7	15.0	12.7	8.4	
	10'' up	43.1	40.7	30.3	12.1	33.0	27.9	18.5	
Elm.....	4''-9''	6.5	6.1	4.5	1.8	8.2	7.0	4.6	
	10'' up	29.8	28.1	21.0	8.4	24.8	20.9	13.9	
Hornbeam.....	4''-9''	11.1	10.5	7.8	3.1	16.3	13.8	9.2	
	10'' up	4.9	4.7	3.5	1.4	1.7	1.4	0.9	
Oak.....	4''-9''					25.5	21.5	14.3	4.5
	10'' up					34.5	29.2	19.3	6.0
White birch.....	4''-9''					110.1	93.1	61.7	25.4
	10'' up					60.9	51.4	34.1	5.4
Poplar.....	4''-9''					149.3	126.2	83.6	121.5
	10'' up					198.7	167.9	111.3	52.6
Red maple.....	4''-9''	36.9	34.8	25.9	10.3	116.5	98.4	65.2	5.5
	10'' up	47.7	45.0	33.5	13.4	102.5	86.6	57.4	
Ash.....	4''-9''	21.2	20.0	14.9	5.9	59.6	50.4	33.4	
	10'' up	35.2	33.2	24.7	9.9	48.4	40.9	27.1	
Black cherry.....	4''-9''					15.8	13.3	8.8	1.2
	10'' up					5.2	4.4	2.9	
TOTAL HARDWOODS.....	4''-9''	327.9	309.1	230.1	91.8	730.6	617.5	409.2	169.7
	10'' up	2190.7	2065.9	1538.6	614.4	1099.4	928.9	615.6	142.2
GRAND TOTAL.....	4''-9''	607.6	572.8	426.5	170.2	1259.7	1064.6	705.6	260.7
	10'' up	3422.4	3227.2	2403.5	959.8	1740.3	1470.4	974.4	354.3
TOTAL 4' UP.....		4030.0	3800.0	2830.0	1130.0	3000.0	2535.0	1680.0	615.0

## *Notes*

---







**Hon. Welland S. Gemmell**

*Minister*

**F. A. MacDougall**

*Deputy Minister*

Report No. 8 of the  
**PARRY SOUND DISTRICT**

CAZON  
LF  
-F56



# *Forest Resources Inventory*

—1953—

Division of Timber Management  
Ontario Department of Lands and Forests





# *Forest Resources Inventory*

— 1953 —

Report No. 8 of the  
**PARRY SOUND DISTRICT**



Division of Timber Management  
**Ontario Department of Lands and Forests**

# PREFACE

● During the past few years a province-wide survey of forest resources has been in progress in Ontario. This was started early in 1946 under the direction of the Division of Timber Management of the Ontario Department of Lands and Forests. Commencing April 1, 1951, one-half of the cost of the forest resources inventory has been paid by the Federal Department of Resources and Development, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources of the Province, the Department of Lands and Forests has set up twenty-two districts, which constitute the field administrative units of the Department. The forest resources inventory covers sixteen of these districts and parts of two additional districts. The inventory covers the accessible forest area of Ontario, totalling 172,000 square miles. This report deals with the results of the inventory in the Parry Sound district.

The inventory for the Parry Sound district was prepared from aerial photographs taken during the summer seasons of 1946, 1947 and 1949, and compiled from data collected in the field in 1947, 1949 and 1950. The entire report results from the work of the Department of Lands and Forests.

While this report deals primarily with the physical wood resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the province as a whole. Only through planned forest management can this desirable objective be attained.



# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	20
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	24
AREAS.....	9	APPENDIX.....	26
FOREST LAND OWNERSHIP.....	9	SURVEY METHODS.....	26
AGE CLASSES.....	10	MEAN ANNUAL INCREMENT.....	26
REGIONAL FOREST TYPES.....	11	AGE CLASSES.....	26
COVER TYPES.....	12	ROTATION.....	27
VOLUME.....	13	CULL FACTORS.....	27
CONIFERS VS. HARDWOODS.....	14	ALLOWABLE CUT.....	27
SAWLOGS VS. CORDWOOD.....	14		

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES.....	9	FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL HARDWOOD SPECIES ON CROWN LAND BY AGE CLASSES AND SIZE CLASSES.....	17
FIG. 2 — LAND OWNERSHIP WITHIN THE PARRY SOUND DISTRICT.....	10	FIG. 12 — VOLUME OF IMMATURE TIMBER BY SIZE CLASSES ON PATENTED LAND IN THE PARRY SOUND DISTRICT.....	17
FIG. 3 — PARRY SOUND DISTRICT, 1951.....	10	FIG. 13 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE PARRY SOUND DISTRICT.....	21
FIG. 4 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO AGE CLASSES.....	11	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND IN THE PARRY SOUND DISTRICT.....	22
FIG. 5 — VOLUME OF PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	13	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LAND IN THE PARRY SOUND DISTRICT.....	22
FIG. 6 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SPECIES AND AGE CLASSES.....	13	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LAND IN THE PARRY SOUND DISTRICT.....	23
FIG. 7 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	14	FIG. 17 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS BY SPECIES ON CROWN LAND.....	24
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SIZE CLASSES.....	15	FIG. 18 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF HARDWOODS BY SPECIES ON CROWN LAND.....	25
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LANDS BY SIZE CLASSES.....	15		
FIG. 10 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LAND BY AGE CLASSES AND SIZE CLASSES.....	16		







# SURVEY HIGHLIGHTS

1. The total area of Parry Sound district is 3,830,625 acres or 5,985 square miles. The cover type distribution of 2,847,587 acres of productive forest land is 57 per cent hardwood, 34 per cent mixedwoods, 8 per cent coniferous and one per cent reproducing forest. By age classes this area is 20 per cent reproducing forest and regeneration areas, 71 per cent immature forests and 9 per cent mature forest areas.

2. Privately owned lands cover an area of 1,598,929 acres or 42 per cent of the total district area. Developed agricultural lands occupy 205,807 acres or about 13 per cent of the patented land area.

3. The Parry Sound district once contained large areas of white and red pine, now greatly reduced through extensive lumbering and fire. The general character is that of hardwood and mixedwoods where hard maple, yellow birch and poplar play prominent part with hemlock and mostly second growth white pine in admixture.

4. The total timber resources of the district are almost 4.2 billion cubic feet, 2.3 billion on Crown lands and 1.9 billion on patented lands. Three-

quarters of the volume is made of hardwoods. About 1.6 billion cubic feet are in 4-9 inch d.b.h. size, the remainder of 2.6 billion cubic feet are of sawlog size.

5. The annual allowable cut on Crown lands is 9.9 million cubic feet, 1.2 million cubic feet for conifers and 8.7 million cubic feet for hardwoods, before any deductions are made for losses.

6. The annual allowable cut on patented lands is 47.6 million cubic feet, about five times the allowable cut on Crown lands, with 8.1 million cubic feet for conifers and 39.5 million cubic feet for hardwoods.

7. A comparison of the annual allowable cut with the actual utilization of timber on Crown lands shows a heavy overcut in white and red pine, hemlock, the two spruces and balsam fir. If cutting of these species will go on at the present rate, then the existing mature timber will be exhausted in 3 years for pine, spruce in 9 years and hemlock in 7 years. Conifers, as a whole, were cut at a rate approximately 8 times the allowable cut, the cut of hardwoods was 77 per cent of the allowable cut.



*Heavy thinning and lopping, and scattering of brush, promotes regeneration.*



MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50

MARCH 1933





*Forest resources inventory photograph of Town of Parry Sound taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*



# FOREST INVENTORY

## Areas

● The total area of the Parry Sound district, excluding both Indian Reserve lands and the adjacent islands in Georgian Bay, is 3,830,625 acres (table 1), or 5,985 square miles, made up of 79 surveyed townships. Water covers an area of 421,454 acres, or 11 per cent of the total area, leaving a net land area of 3,409,171 acres. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 252,579 acres, or about 7 per cent of the total area. Non-forested lands, including lands permanently withdrawn from timber production, comprise 309,005 acres, or about 8 per cent of the total area (fig. 1). In this classification are the important developed

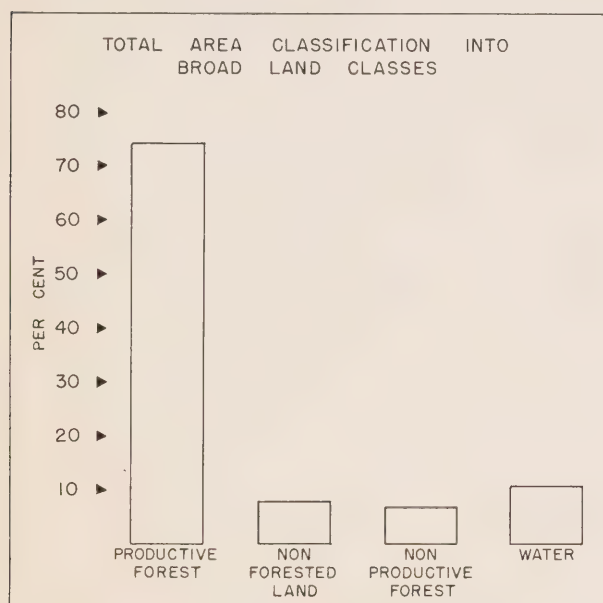


FIGURE 1

agricultural lands, amounting to 210,442 acres, grass and meadow lands amounting to 61,748 acres, and 34,395 acres comprising lands occupied by cities, towns, villages, roads and railroads, or otherwise withdrawn from forest production.

The Parry Sound district is essentially a timber-

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

TABLE 1. — Total area classification into broad land and ownership groupings.

Kind of area	Crown land acres	Patented land acres	Total acres
Productive forest land <sup>1</sup> .....	1,640,025	1,207,562	2,847,587
Non-forested land <sup>2</sup>			
Developed agricultural land.....	4,635	205,807	210,442
Grass and meadow land.....	4,204	57,544	61,748
Non-reproducing burn.....	1,572	848	2,420
Unclassified land <sup>3</sup> .....	4,283	30,112	34,395
TOTAL.....	14,694	294,311	309,005
Non-productive forest <sup>4</sup>			
Open muskeg.....	40,461	15,972	56,433
Treed muskeg (scrub).....	18,549	6,903	25,452
Brush, alder and flooded land.....	58,556	63,309	121,865
Rock outcrop.....	37,901	10,698	48,599
Barrens.....	56	174	230
TOTAL.....	155,523	97,056	252,579
Water.....	421,454		421,454
TOTAL AREA.....	2,231,696	1,598,929	3,830,625

producing area with 2,847,587 acres, or 74 per cent of the total area classified as productive forest land (fig. 1). This district once contained large areas of white and red pine but extensive lumbering and fire have removed the greater part. The general character is that of mixed forest containing hard maple, yellow birch, hemlock and white pine. There are also areas of pure hardwood, with a dominance of hard maple. Many of the original pine areas are now covered with second growth poplar and white birch stands, following logging and forest fires.

## Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort,



and for other uses. All of these various types of ownership are grouped under "Patented lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at the time patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands therefore presents an exceedingly complicated picture. In the course of the inventory no attempt has been made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

Of the total area of the Parry Sound district, 2,231,696 acres are in the ownership of the Crown, and 1,598,929 acres are patented land (table 1). Taking the total area of the district into consideration, 58 per cent is Crown land and 42 per cent is patented land. Considering only the productive forest land totalling 2,847,587 acres, almost the same percentages hold true with 58 per cent in Crown ownership and 42 per cent patented land (fig. 2). Patented land is further classified on a township basis into those townships containing less than 10 per cent patented lands; those containing between 10 and 50 per cent patented lands, and townships containing over 50 per cent patented lands (fig. 3).

Of the total patented land area of 1,598,929 acres, 205,807 acres or 13 per cent is developed for farming purposes. An additional area of 57,544 acres is grass

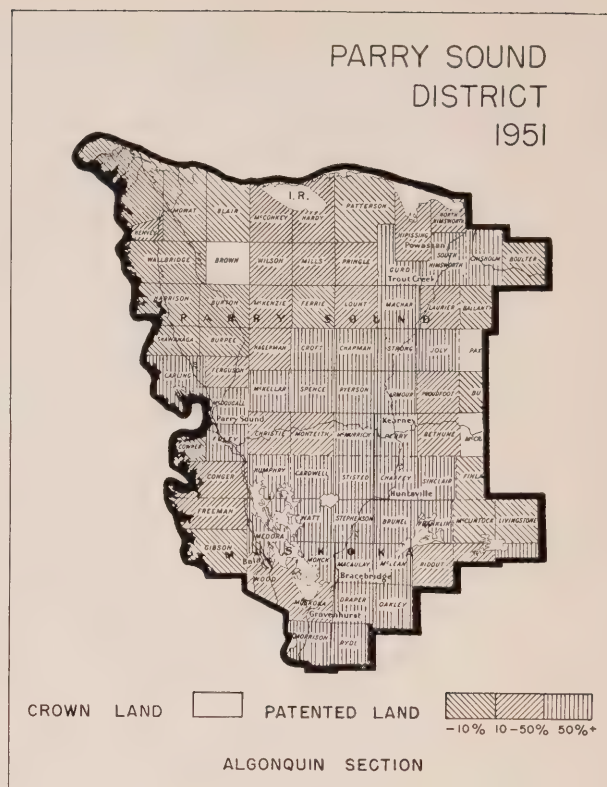


FIGURE 3

and meadow land. There is a further area of 4,635 acres of developed agricultural land and 4,204 acres of grass and meadow land under Crown ownership. These lands under Crown ownership are for the most part located lands for which letters patent have not been issued.

### Age Classes

For sustained yields a forest should be made up of all age classes and stages of development from seedlings to mature timber in such proportions that when one group of trees is harvested, another is ready to take its place. For the Parry Sound district, if the forests are to be operated on an average rotation of 100 years with a productive forest area of 1,640,025 acres on Crown lands there should be 16,400 acres in the mature age class ready to be cut and an equal area 99 years old and so on down to one year old. Ideally therefore we should have 16,400 acres mature, 1,082,417 acres in the immature age class, and 541,208 acres in the young growth and reproducing forest class. The actual distribution on Crown lands (table 2), shows 180,910 acres mature, 1,064,110 acres immature and 395,005 acres in the young growth and regeneration classes. The age

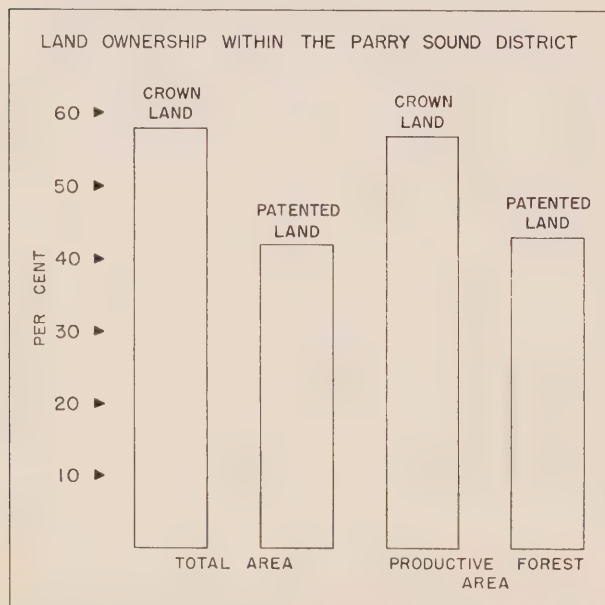


FIGURE 2

class distribution for the Crown land portion of the productive forest is not very far from normal.

Patented lands with a productive forest area of 1,207,562 acres normally should have a mature area of 12,076 acres, an immature area of 796,991 acres and an area of young growth and reproducing forest amounting to 398,495 acres. Patented lands for the Parry Sound district actually show 77,354 acres mature, 966,298 acres immature and 163,910 acres young growth and reproducing forest.

These comparisons would be fully justified only if the actual average rotation for species in the Parry Sound district was 100 years.

The normality of age class distribution applies only to the general age class distribution when classified into broad age classes. Most of the immature stands are under 60 years of age which leaves a deficit in the age classes just below maturity. This deficit in age classes, approaching maturity, amounts to approximately one-third the rotation.

For the district as a whole 258,264 acres or 9 per cent of the productive forest is mature, 2,030,408 acres or 71 per cent is immature and 558,915 acres

or 20 per cent is in the young growth and reproducing forest class (table 2, fig. 4).

### Regional Forest Types

The forested area of the province has been divided into regions or sections, based on a broad uniformity of tree species associations resulting from climatic changes throughout the area. Various factors such as the proximity of large bodies of water, topography, soil characteristics and other local conditions contribute to modify the response of forest growth to the overall climatic conditions.

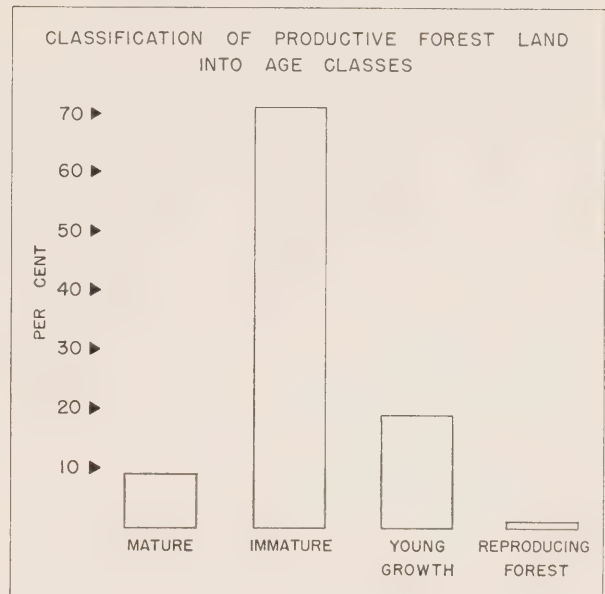


FIGURE 4

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	Productive forest
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	5,183	3,364	8,547	.....
Hardwood.....	140,035	61,965	202,000	7
Mixedwoods.....	35,692	12,025	47,717	2
TOTAL.....	180,910	77,354	258,264	9
Immature forest:				
Coniferous.....	120,015	61,543	181,558	6
Hardwood.....	385,827	605,272	991,099	35
Mixedwoods.....	558,268	299,483	857,751	30
TOTAL.....	1,064,110	966,298	2,030,408	71
Young growth:				
Coniferous.....	48,908	9,552	58,460	2
Hardwood.....	287,813	140,174	427,987	15
Mixedwoods.....	40,650	10,526	51,176	2
TOTAL.....	377,371	160,252	537,623	19
Reproducing forest.....	17,634	3,658	21,292	1
TOTAL PRODUCTIVE FOREST.....	1,640,025	1,207,562	2,847,587	100

Separate volume and stock tables are made for each region or ecological section and they serve as the basis for computing volume estimates. These tables were made up for each year field work was undertaken in the section. There may be, therefore, two or three sets of volume and stock tables made up for any one ecological section. Later these tables will be combined into one set of tables for the forest region as a whole. The Parry Sound district is wholly within what is known as the Algonquin region or ecological section (fig. 3). As the district was covered by field work in three different years 1947, 1949 and 1950, three sets of volume and stock tables were prepared.

The Algonquin section is characterized by the presence of tolerant hardwoods, maple and yellow birch and their associated species occurring in consolidated commercial stands on the well-drained



sites. These stands originally contained an admixture of white pine which reached its finest individual development as isolated trees in the hardwood stands. The pine was all removed in the early logging operations and the stands are now nearly pure hardwood, except for an admixture of hemlock occurring regularly in patches throughout the stands. On the lighter sandy and gravelly soils pure stands of red and white pine were the rule in the virgin forest, after logging, pine has regenerated on these areas to a limited extent. Many sections have been burned over several times since the early logging, giving rise to large areas of second growth poplar and white birch and areas of poorly stocked stands, in many cases devoid of tree growth and requiring artificial planting to re-establish a forest.

### Cover Types

The forests of the Parry Sound district are made up of 21 tree species. A total of 12 hardwood species make up 76 per cent of the volume of the mature and immature age classes, and 9 coniferous species account for 24 per cent of the volume. Hard maple and yellow birch together make up 46 per cent of the total volume on productive forest lands, 11 per cent is poplar. The main conifers are white and red pine making up 8 per cent of the total volume and hemlock with 7 per cent. These 5 species make up 72 per cent of the total volume on productive forest lands (table 3).

The forests of the district are separated into three main cover types, coniferous, hardwood and mixedwoods. The coniferous type contains 75 per cent or more conifers or softwood trees, and the hardwood type 75 per cent or more hardwood trees. All other combinations are classed as mixedwoods. Reproducing forest includes all areas of young growth which have not attained a sufficiently stable or complete composition to be classified into types.

The hardwood type occupies 57 per cent of the productive forest area of the district, 34 per cent is mixedwoods, 8 per cent coniferous and one per cent is classified as reproducing forest.

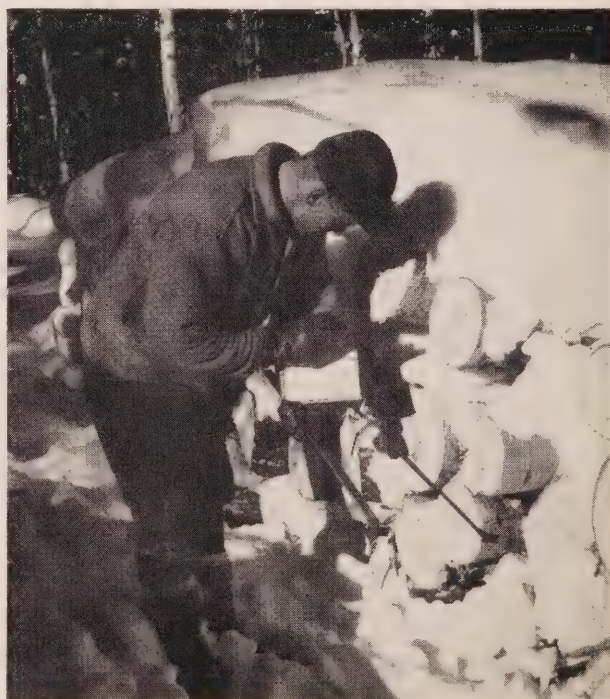
The distribution of cover types for Crown lands with 50 per cent hardwood, 39 per cent mixedwoods, 10 per cent coniferous and one per cent reproducing forest is similar to the productive forest.

On patented lands 67 per cent of the productive forest area is hardwood, 27 per cent mixedwoods, 6 per cent coniferous and a fraction of one per cent reproducing forest.

TABLE 3. — *Percentage of the primary growing stock on productive forest lands in the Parry Sound district in mature and immature stands, by species.*

Species	Mature age class	Immature age class	Productive forest
	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
White pine.....	0.6	9.0	7.4
Red pine.....	0.1	1.0	0.9
Jack pine.....	0.3	0.9	0.7
White spruce.....	1.0	2.1	1.9
Black spruce.....	0.3	0.4	0.4
Balsam fir.....	1.0	4.2	3.6
Hemlock.....	8.7	7.1	7.4
White cedar.....	0.9	1.8	1.7
Larch.....	*	*	*
<b>TOTAL CONIFERS.....</b>	<b>12.9</b>	<b>26.5</b>	<b>24.0</b>
Hard maple.....	47.6	27.5	31.3
Yellow birch.....	29.9	10.6	14.3
Beech.....	4.1	3.8	3.8
White elm.....	1.2	1.5	1.4
Ironwood.....	0.7	1.0	1.0
Red oak.....	*	1.9	1.5
White birch.....	0.3	6.4	5.2
Poplar (all).....	0.3	12.9	10.5
Red maple.....	0.9	3.9	3.3
Ash.....	0.6	2.2	1.9
Basswood.....	1.2	1.1	1.1
Black cherry.....	0.3	0.7	0.7
<b>TOTAL HARDWOODS.....</b>	<b>87.1</b>	<b>73.5</b>	<b>76.0</b>

\* Less than 0.05 per cent.



*Government Scalers check forest products cut on Crown Lands.*



## Volume

The volume of the primary growing stock includes all living trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Parry Sound district is just under 4.2 billion cubic feet (4,192,016,000 cubic feet). This is an average of 1,472 cubic feet per acre (table 4). The mature age class contains just under 800 million cubic feet (table 5), or 3,088 cubic feet per acre, while the immature age class contains 3.4 billion cubic feet or 1,672 cubic feet per acre (fig. 5).

The volume of the primary growing stock on Crown lands in the Parry Sound district is 2,286 million cubic feet (table 6), or an average of 1,394

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average total
	4''-9'' d.b.h.	10'' up d.b.h.	Average	4''-9'' d.b.h.	10'' up d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	468	2,643	3,111	468	2,566	3,034	3,088
Immature.....	727	892	1,619	743	987	1,730	1,672
Productive forest.....	523	871	1,394	624	954	1,578	1,472

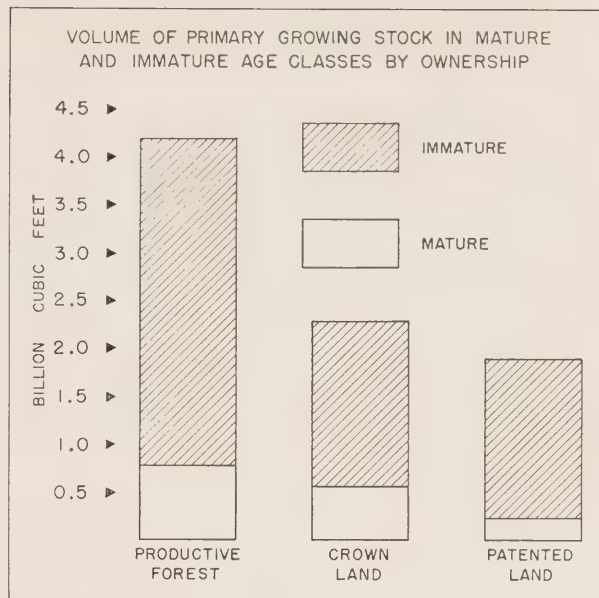


FIGURE 5

cubic feet per acre. The mature age class contains 563 million cubic feet, or 3,111 cubic feet per acre. The immature age class on Crown lands contains 1,723 million cubic feet or 1,619 cubic feet per acre.

Patented lands in the Parry Sound district have an area of 1,207,562 acres or 42 per cent of the total productive forest area. They contain a total of 1,906 million cubic feet (table 7) or 1,578 cubic feet per acre. The mature age class, occupying 77,354 acres, contains 235 million cubic feet or 3,034 cubic feet

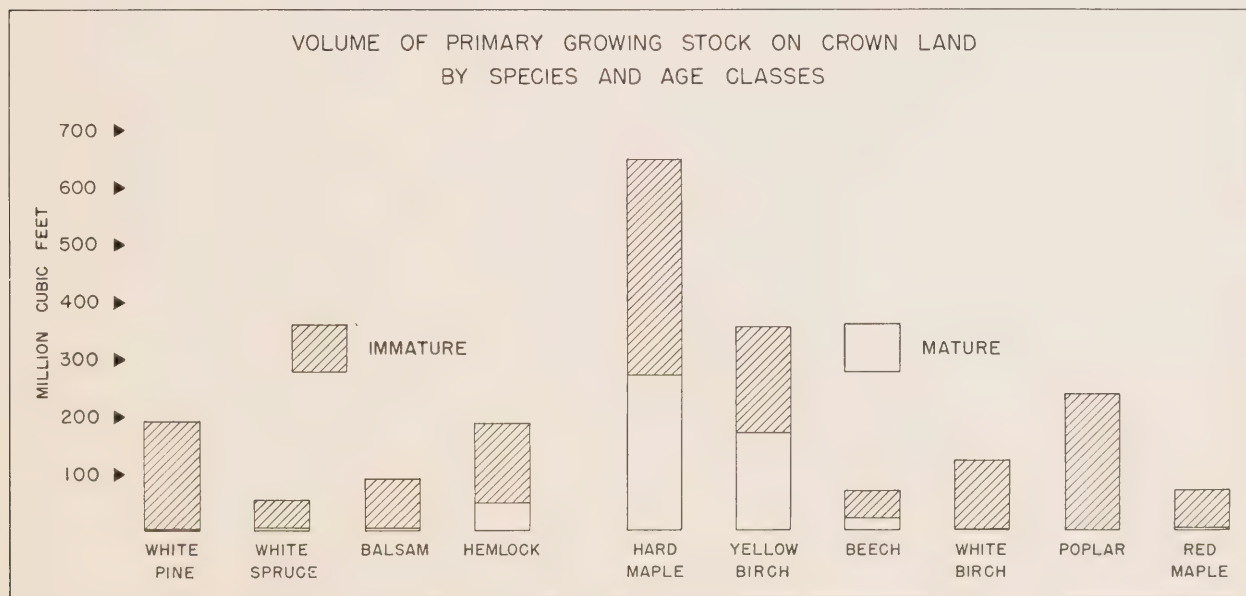


FIGURE 6

per acre. The immature age class contains 1,671 million cubic feet or 1,730 cubic feet per acre (fig. 5).

#### *Conifers vs. Hardwoods*

The volume of the primary growing stock is divided in a ratio of approximately 3 to 1 in favour of hardwoods to conifers, with 3,185 million cubic feet or 76 per cent of the growing stock made up of hardwoods, and 1,007 million cubic feet or 24 per cent comprising the coniferous content (table 8). In the mature age class the hardwood volume is almost seven times as great as the conifer volume, with 695 million cubic feet of hardwoods, and only 103 million cubic feet of conifers. In the immature age class the hardwood volume is also greater by nearly 3 times, with the hardwood volume contributing 2,491 million cubic feet and the conifer volume 904 million cubic feet. There appears to be a decided shortage in the softwood content of the forest in this district.

The principal species making up the two groups conifers and hardwoods are shown in figure 6. Conifers comprise 4 main species: white pine, white spruce, balsam fir and hemlock. The principal hardwoods consist of six species, four species usually classed as tolerant hardwoods, hard maple, yellow birch, beech and red maple, and two intolerant species, white birch and poplar. Poplar is made up of three main species, of which aspen is the most important in volume, followed by balsam poplar and large-toothed aspen.

Upon examination of the mature and immature age classes, there appears to be a decided increase of the coniferous species, in the growing stock in the immature age class. In the mature age class of the total productive forest, the coniferous species have a growing stock of 103 million cubic feet, or 13 per cent of the total growing stock. In the immature age class coniferous species total 904 million cubic feet, or 27 per cent of the total growing stock. This is even more pronounced on Crown lands, where conifers account for 13 per cent of the mature growing stock and 32 per cent of the immature growing stock. White and red pine have increased considerably in the immature age class. Together these two species have a growing stock of 347 million cubic feet on the total productive forest. Of this, 6 million cubic feet are in the mature age class and 341 million cubic feet in the immature age class. In the mature class they form less than one per cent of the total growing stock, but in the immature age

class they account for 10 per cent. There has also been a large increase in poplar and white birch in the immature age class, increasing from less than one per cent in the mature age class to over 19 per cent in the immature age class.

#### *Sawlogs vs. Cordwood*

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as pulpwood and cordwood material depending on species, although poles, railway ties, and other products may be ob-

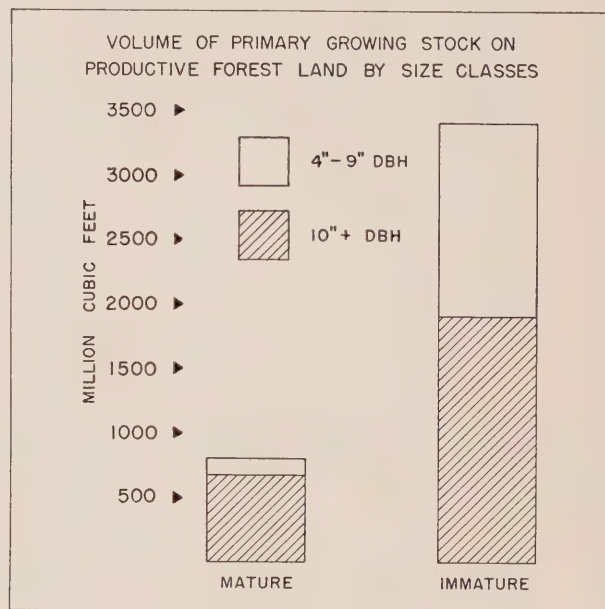


FIGURE 7

tained from this size class. Volumes in the 10 inch and over size class have values for sawlogs, and other uses where larger timber is required. A tree 10 inches d.b.h. outside bark will on the average give one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition there is residual smaller size material in the top which may be used as pulpwood or for purposes other than saw timber. The quantity in this residual top is relatively small and is included in the 10 inches and over material in all inventory estimates. With better utilization practices, and where economic conditions warrant, this residual material will be used on an increasing scale.

Of the volume of the primary growing stock on productive forest lands, 1,612 million cubic feet are

in the 4-9 inch d.b.h. size class, and 2,580 million cubic feet in the 10 inch d.b.h. class and over (table 8). For both species groups and for the productive forest area as a whole, the volume in sawlogs exceeds the volume in the cordwood size class. This is particularly noticeable in the hardwood group.

For the mature age class the volume in the size class 10 inches d.b.h. and over, amounting to 677 million cubic feet is five and one-half times the volume in the 4-9 inch class with 121 million cubic feet (fig. 7). When the hardwoods are compared, the 10 inch d.b.h. class has about six times the volume of the 4-9 inch class. In the coniferous group, the 10 inch d.b.h. class has about three times the volume of the 4-9 inch class (table 8).

The immature age class presents an entirely different picture, with the volume in the size class 10 inches and over being very little greater than the volume in the 4-9 inch class. This relationship also holds when conifers and hardwoods are compared separately.

An analysis of relationship of the two size classes for Crown lands (table 9, fig. 8) and for patented lands (table 10, fig. 9) shows a fairly consistent relationship between the volume in the two size classes with that for the area as a whole. This consistent relationship also seems to hold fairly well for the species groups when considered separately.

The volume relationship of the two size classes 4-9 inches d.b.h. and 10 inches and over for the

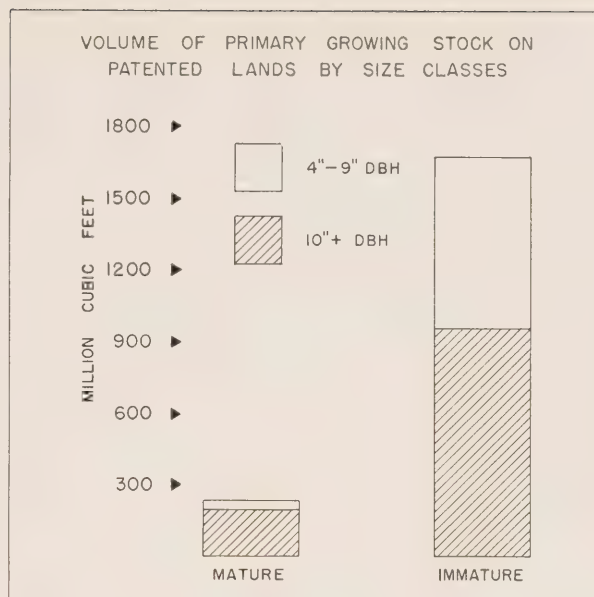


FIGURE 9

principal species in mature and immature forest is shown in figure 10 for conifers, and figure 11 for hardwoods which graphically represent table 9, for Crown lands. White pine in the mature forest is nearly all in the sawlog size class. In the immature age class about two-thirds of the volume is 10 inches d.b.h. and over. White spruce has most of its volume in the sawlog size in the mature age class, and about one-half its volume in the sawlog size in the im-

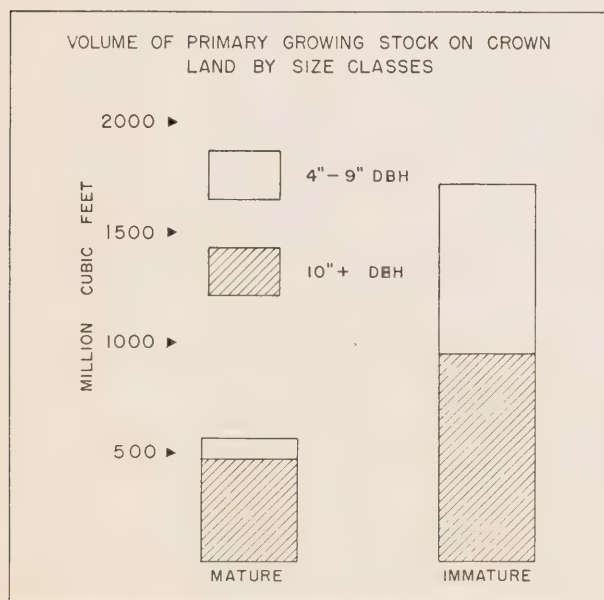


FIGURE 8



Checking detail on base map with aerial photo.



mature age class. Balsam fir has only about one-fifth of its volume 10 inches d.b.h. and over in the mature age class, and only one-eighth 10 inches d.b.h. and over in the immature age class. Hemlock has about six-sevenths of its volume 10 inches d.b.h. and over in the mature age class and two-thirds of its volume 10 inches and over in the immature class.

The size relationships of the main hardwood species are shown in figure 11. In the mature age class there is very little of either white birch or poplar. In the immature age class, most of the volume is in

the 4-9 inch class with about two-thirds of the white birch volume in this class and well over one-half of the poplar. The greater part of the volume of the tolerant hardwoods is in the sawlog size class. In the mature age class, hard maple shows five-sixths of the volume 10 inches d.b.h. and over and two-thirds 10 inches d.b.h. and over in the immature age class. There is very little yellow birch in the mature age class under 10 inches, and in the immature class four-fifths of the volume is 10 inches or over. In the mature age class both beech and red maple show

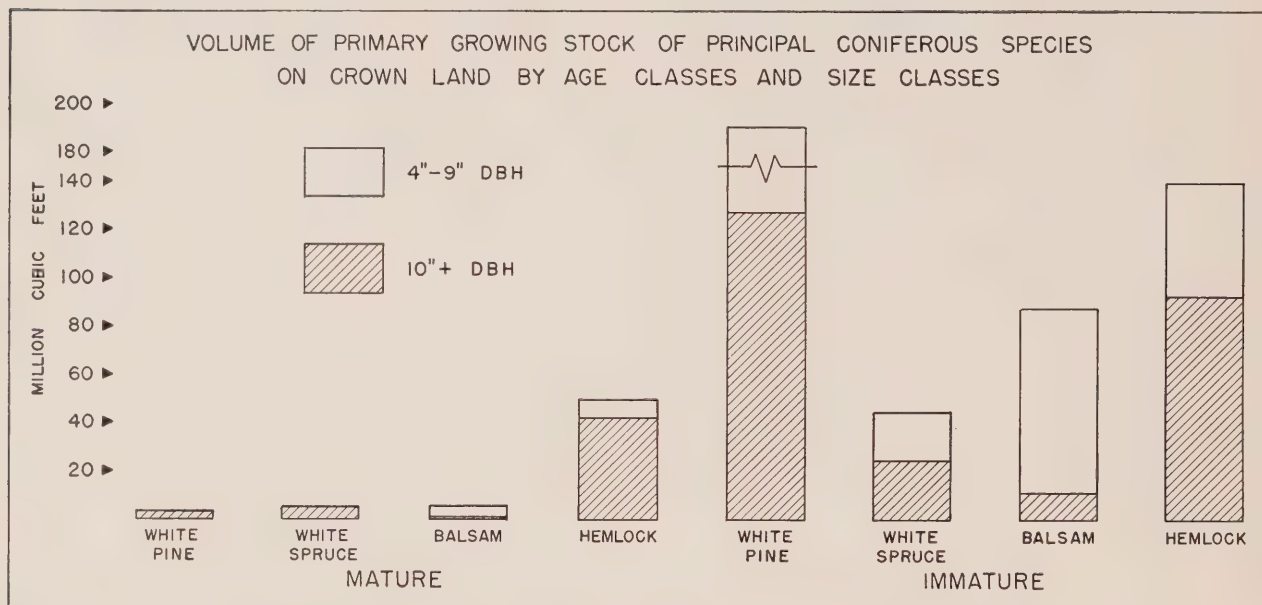
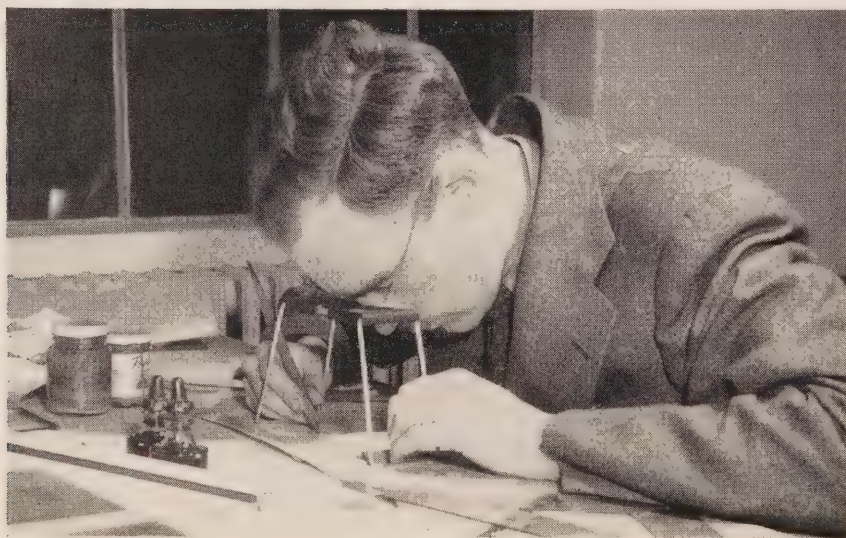


FIGURE 10



*Forest cover is interpreted by stereoscope from aerial photos.*

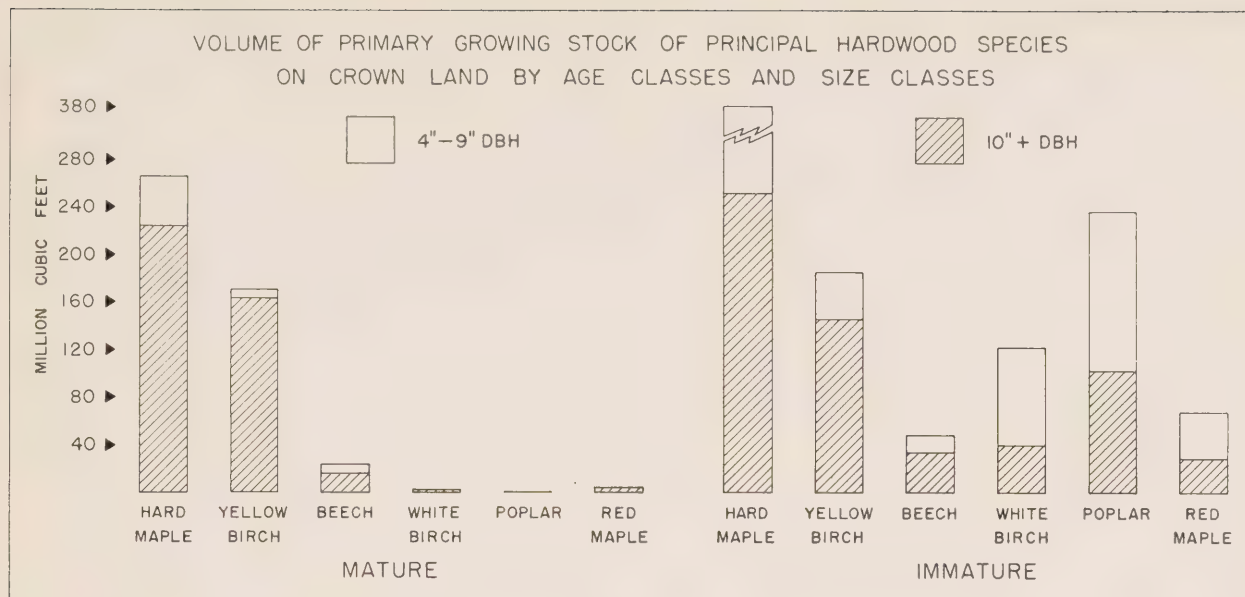


FIGURE 11

two-thirds of their volumes 10 inches d.b.h. and over. Beech also shows two-thirds of its immature volume 10 inches d.b.h. and over, but red maple shows only one-third 10 inches and over in this age class.

On patented lands, the proportion of conifers to hardwoods is similar to that on Crown lands. Poplar and white birch have practically no volume in the mature forest. White birch has two-thirds of its immature volume in the 4-9 inch class, while poplar

has well over one-half its volume in the 4-9 inch class. The tolerant hardwoods, hard maple and yellow birch both have most of their volumes in the larger diameter class. On the whole, patented land is producing larger timber than Crown land. The volume relationship of the two size classes 4-9 inches d.b.h. and 10 inches and over for the principal species in the immature forest is shown in figure 12, for patented land.

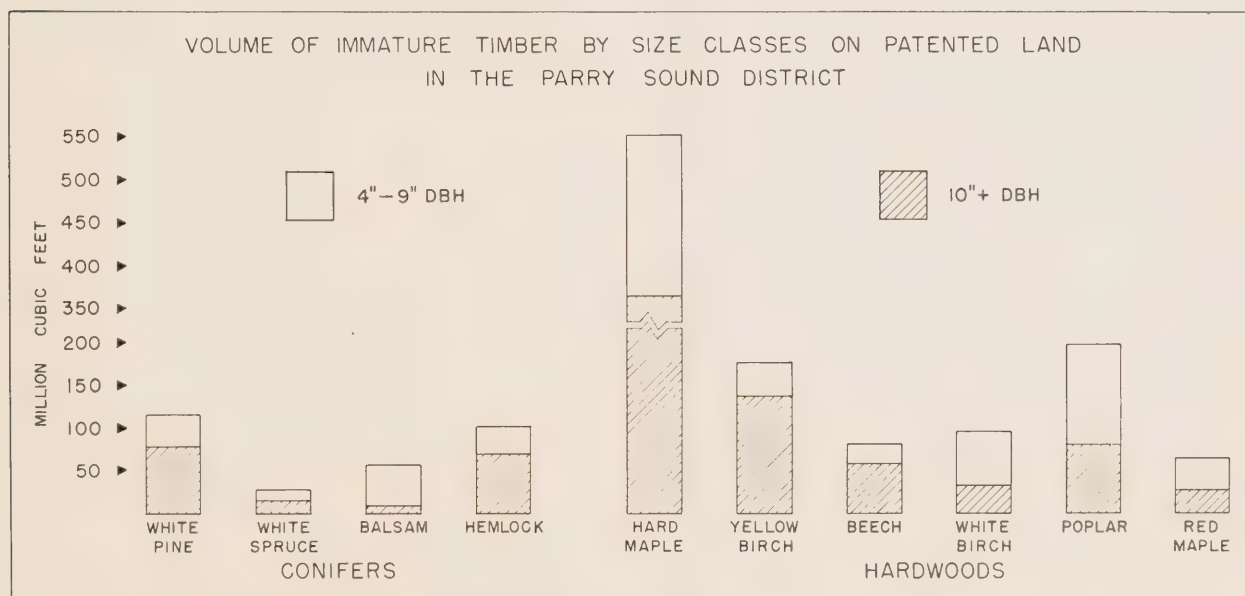


FIGURE 12

TABLE 5. — *Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Parry Sound district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>
Coniferous.....	6,760	13,846	144,562	134,984	300,152
Hardwood.....	92,609	543,620	723,968	972,607	2,332,804
Mixedwoods.....	21,467	119,236	622,807	795,550	1,559,060
TOTAL.....	120,836	676,702	1,491,337	1,903,141	4,192,016

TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown land in the Parry Sound district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>
Coniferous.....	4,163	8,716	93,350	86,021	192,250
Hardwood.....	64,282	279,892	275,378	358,723	1,078,275
Mixedwoods.....	16,210	89,608	404,644	504,983	1,015,445
TOTAL.....	84,655	478,216	773,372	949,727	2,285,970

#### ALL CONIFERS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>
Coniferous.....	5,932	10,433	124,123	106,373	246,861
Hardwood.....	8,615	25,802	35,862	67,066	137,345
Mixedwoods.....	10,122	42,129	263,082	307,151	622,484
TOTAL.....	24,669	78,364	423,067	480,590	1,006,690

#### ALL CONIFERS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>
Coniferous.....	3,661	6,730	80,204	67,814	158,409
Hardwood.....	5,945	17,866	13,728	25,889	63,428
Mixedwoods.....	7,651	31,670	170,535	196,429	406,285
TOTAL.....	17,257	56,266	264,467	290,132	628,122

#### ALL HARDWOODS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>
Coniferous.....	828	3,413	20,439	28,611	53,291
Hardwood.....	83,994	517,818	688,106	905,541	2,195,459
Mixedwoods.....	11,345	77,107	359,725	488,399	936,576
TOTAL.....	96,167	598,338	1,068,270	1,422,551	3,185,326

#### ALL HARDWOODS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>	<i>Thousand cu. ft.</i>
Coniferous.....	502	1,986	13,146	18,207	33,841
Hardwood.....	58,337	362,026	261,650	332,834	1,014,847
Mixedwoods.....	8,559	57,938	234,109	308,554	609,160
TOTAL.....	67,398	421,950	508,905	659,595	1,657,848



TABLE 7.—Cubic-foot volumes of primary growing stock on patented land in the Parry Sound district by species groups, age class and cover type in two size classes.

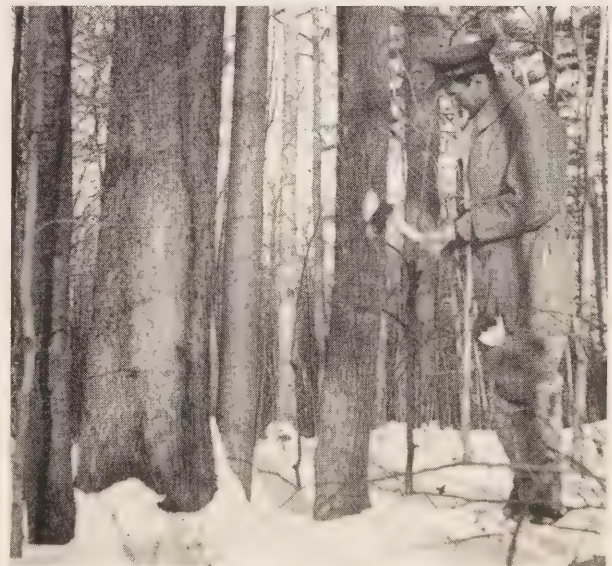
ALL SPECIES					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	2,597	5,130	51,212	48,963	107,902
Hardwood.....	28,327	163,728	448,590	613,884	1,254,529
Mixedwoods.....	5,257	29,628	218,163	290,567	543,615
TOTAL.....	36,181	198,486	717,965	953,414	1,906,046

ALL CONIFERS					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	2,271	3,703	43,919	38,559	88,452
Hardwood.....	2,670	7,936	22,134	41,177	73,917
Mixedwoods.....	2,471	10,459	92,547	110,722	216,199
TOTAL.....	7,412	22,098	158,600	190,458	378,568

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	326	1,427	7,293	10,404	19,450
Hardwood.....	25,657	155,792	426,456	572,707	1,180,612
Mixedwoods.....	2,786	19,169	125,616	179,845	327,416
TOTAL.....	28,769	176,388	559,365	762,956	1,527,478

TABLE 8.—Cubic-foot volumes of primary growing stock on productive forest land in the Parry Sound district by species and age classes in two size classes.

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
White pine.....	801	3,872	100,328	205,455	310,456
Red pine.....	359	506	14,944	20,254	36,063
Jack pine.....	1,341	1,104	26,786	2,173	31,404
White spruce.....	1,329	6,713	31,332	39,209	78,583
Black spruce.....	1,163	1,252	11,782	3,325	17,522
Balsam fir.....	6,836	1,478	125,274	18,458	152,046
Hemlock.....	10,468	58,667	77,821	163,442	310,398
White cedar.....	2,348	4,772	33,851	28,192	69,163
Larch.....	24		949	82	1,055
TOTAL CONIFERS.....	24,669	78,364	423,067	480,590	1,006,690
Hard maple.....	63,443	316,304	323,693	609,086	1,312,526
Yellow birch.....	10,352	228,042	78,629	282,819	599,842
Beech.....	9,484	22,960	37,512	90,955	160,911
Elm.....	1,293	8,037	17,913	32,617	59,860
Ironwood.....	4,018	1,316	31,908	3,530	40,772
Red oak.....		4	33,179	29,970	63,153
White birch.....	625	2,088	146,773	70,492	219,978
Poplar (all).....	878	1,427	253,553	182,577	438,435
Red maple.....	2,281	4,944	76,648	55,144	139,017
Ash.....	2,025	2,851	39,708	33,270	77,854
Basswood.....	652	8,945	9,661	26,200	45,458
Black cherry.....	1,116	1,420	19,093	5,891	27,520
TOTAL HARDWOODS.....	96,167	598,338	1,068,270	1,422,551	3,185,326
TOTAL ALL SPECIES.....	120,836	676,702	1,491,337	1,903,141	4,192,016



A Forester marks trees for improvement cutting.

TABLE 9. — *Cubic-foot volumes of primary growing stock on Crown land in the Parry Sound district by species and age classes in two size classes.*

Species	Mature		Immature		Total Crown lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	541	2,765	62,960	127,322	193,588
Red pine.....	236	347	9,281	12,301	22,165
Jack pine.....	785	714	18,904	1,544	21,947
White spruce.....	970	4,892	19,995	24,700	50,557
Black spruce.....	744	781	7,616	2,144	11,285
Balsam fir.....	4,840	1,022	76,199	11,086	93,147
Hemlock.....	7,455	42,232	46,860	92,519	189,066
White cedar.....	1,673	3,513	22,075	18,468	45,729
Larch.....	13	.....	577	48	638
TOTAL CONIFERS.....	17,257	56,266	264,467	290,132	628,122
Hard maple.....	44,512	222,641	129,944	251,492	648,589
Yellow birch.....	7,405	162,509	39,037	145,592	354,543
Beech.....	6,631	15,865	14,428	33,555	70,479
Elm.....	845	5,186	7,450	13,398	26,879
Ironwood.....	2,780	909	13,553	1,407	18,649
Red oak.....	.....	4	15,712	14,479	30,195
White birch.....	496	1,685	81,669	39,536	123,386
Poplar (all).....	646	1,073	135,481	101,809	239,009
Red maple.....	1,545	3,283	39,105	28,539	72,472
Ash.....	1,391	1,977	21,062	18,083	42,513
Basswood.....	432	5,908	3,274	9,248	18,862
Black cherry.....	715	910	8,190	2,457	12,272
TOTAL HARDWOODS.....	67,398	421,950	508,905	659,595	1,657,848
TOTAL ALL SPECIES.....	84,655	478,216	773,372	949,727	2,285,970

TABLE 10. — *Cubic-foot volumes of primary growing stock on patented lands in the Parry Sound district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	260	1,107	37,368	78,133	116,868
Red pine.....	123	159	5,663	7,953	13,898
Jack pine.....	556	390	7,882	629	9,457
White spruce.....	359	1,821	11,337	14,509	28,026
Black spruce.....	419	471	4,166	1,181	6,237
Balsam fir.....	1,996	456	49,075	7,372	58,899
Hemlock.....	3,013	16,435	30,961	70,923	121,332
White cedar.....	675	1,259	11,776	9,724	23,434
Larch.....	11	.....	372	34	417
TOTAL CONIFERS.....	7,412	22,098	158,600	190,458	378,568
Hard maple.....	18,931	93,663	193,749	357,594	663,937
Yellow birch.....	2,947	65,533	39,592	137,227	245,299
Beech.....	2,853	7,095	23,084	57,400	90,432
Elm.....	448	2,851	10,463	19,219	32,981
Ironwood.....	1,238	407	18,355	2,123	22,123
Red oak.....	.....	.....	17,467	15,491	32,958
White birch.....	129	403	65,104	30,956	96,592
Poplar (all).....	232	354	118,072	80,768	199,426
Red maple.....	736	1,661	37,543	26,605	66,545
Ash.....	634	874	18,646	15,187	35,341
Basswood.....	220	3,037	6,387	16,952	26,596
Black cherry.....	401	510	10,903	3,434	15,248
TOTAL HARDWOODS.....	28,769	176,388	559,365	762,956	1,527,478
TOTAL ALL SPECIES.....	36,181	198,486	717,965	953,414	1,906,046



*Typical log storage booms.*

### *Allowable Cut*

The calculations of the allowable cut have been carried out by means of a formula<sup>1</sup> using an appropriate rotation<sup>2</sup>. The amount of the annual allowable cut results directly from the volume of the primary growing stock and rotation age used for the different species encountered in the district. The present allowable cut figures like the volume of the primary growing stock may be on areas which, at the moment, are inaccessible to operations. The allowable cut volumes may likewise be in stands which due to low yield are economically inoperable. Taking these conditions into account, the computed allowable cut is regarded as potential, rather than actually obtainable under present operating conditions.

Woods operations are being carried on each year and with present stands growing older, the size and structure of the primary growing stock will change. The calculations of the allowable cut based upon

<sup>1</sup> Methods of calculation of allowable cut are given in Appendix, allowable cut, page 27.

<sup>2</sup> Rotation ages by species, table 16, page 27.



the present volume of the primary growing stock are of value for a period of about ten years. On expiration of the initial ten year period the allowable cut should be calculated anew, based on the experience of the first ten year period and in conformity with the actual performance of the forest. With effective forestry practices allowable cuts for the more valuable species will tend, almost certainly, to increase, without improved forestry practices, the present trend to more poplar, white birch and maple at the expense of red and white pine will continue.

Patented lands are, on the average, being operated

to be carried on profitably, concentrations of merchantable stands with a fair utilizable volume per acre are necessary. The immature forest generally does not supply sufficient concentrations of volumes of merchantable timber to supply operations of this kind. Patented lands, on the other hand, are for the most part in small individual holdings with the owner resident on the lot or in the close vicinity. These lands are in the more densely populated sections with well kept roads and a market for fuelwood and other small products. There is a ready market locally for small groups of logs at custom sawmills. These

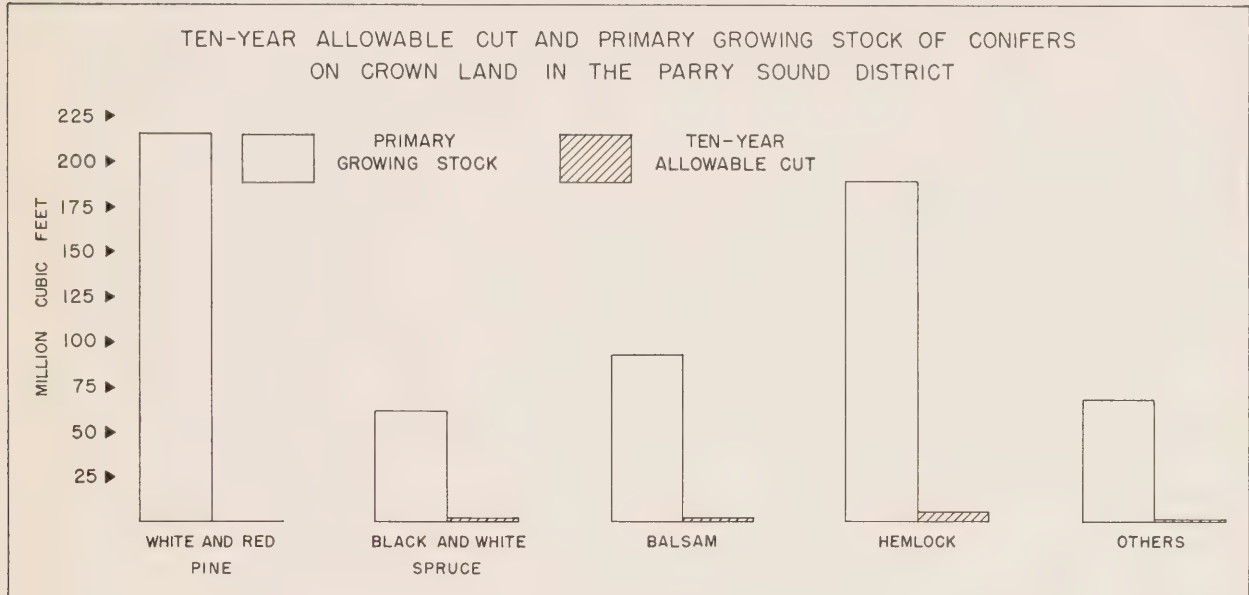


FIGURE 13

on a short rotation and in these circumstances the allowable cut for patented land has been calculated on a shorter rotation than for Crown lands of the district.

The annual allowable cut, or net depletion allowable under management in the Parry Sound district is 57,446,035 cubic feet, only 9,876,120 cubic feet from Crown lands and 47,569,915 cubic feet from patented lands. Of the total allowable cut, 17 per cent is on Crown lands and 83 per cent on patented lands. This considerable difference results from a more conservative approach to the process of regulating yield on Crown lands. The Crown lands generally in the Parry Sound district are in large blocks, frequently with poorly developed all-weather transportation facilities. Woods operations are carried out from company camps with small sawmills of a portable or semi-portable type. For such operations

material differences in the operating conditions on Crown lands in contrast to patented lands seem to fully justify a shorter rotation for regulating the yield on patented lands.

#### CROWN LAND

The annual allowable cut for Crown land represents only 0.4 per cent of the primary growing stock which is made up mostly of immature timber, or 6 cubic feet per acre for the productive forest area. Of the total allowable cut 1,148,825 cubic feet or 12 per cent is coniferous species and 8,727,295 cubic feet, or 88 per cent is of hardwood species. Since the rotation age is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 0.2 per cent of the coniferous primary growing stock and 0.5 per cent for the hardwoods.

The annual allowable cut for the species making



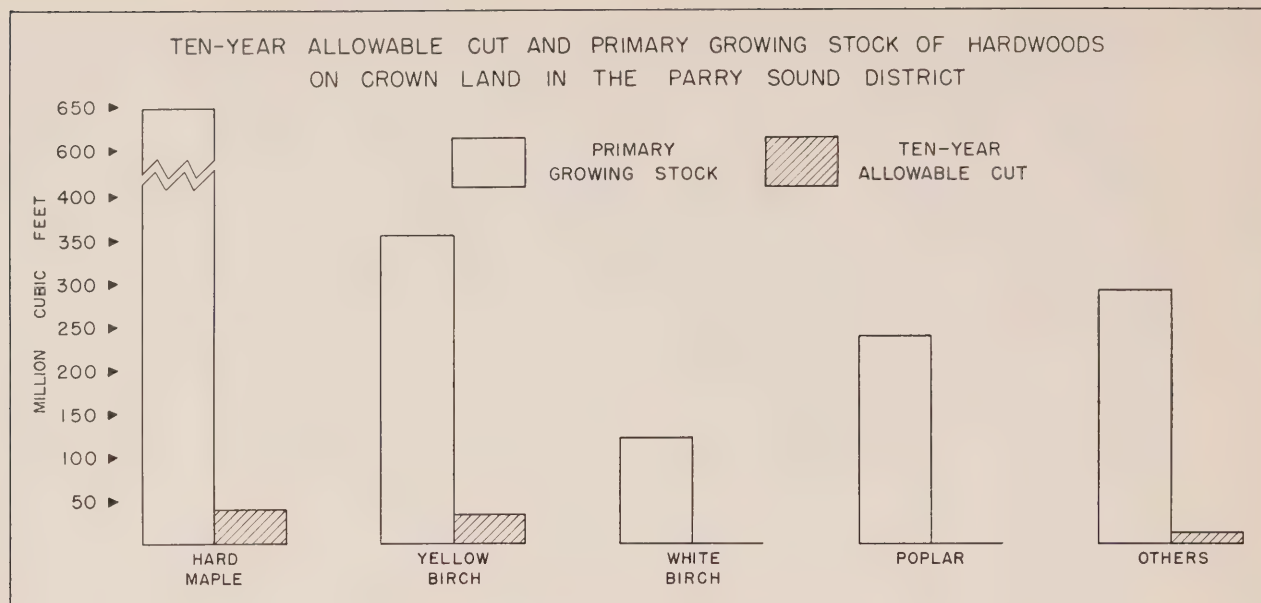


FIGURE 14

up the coniferous content (table 11) shows that 43 per cent is hemlock, 17 per cent balsam, 18 per cent white and black spruce, 9 per cent white and red pine, and 13 per cent other conifers. The relation of the allowable cut for a ten year period to the volume of the primary growing stock for conifers by species is shown graphically, figure 13.

The species making up the hardwood content (table 12) shows that about 46 per cent is hard maple and another 39 per cent is yellow birch. All other

species appear in inappreciable volumes. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock for hardwoods by species is shown graphically, figure 14.

#### PATENTED LAND

The annual allowable cut for patented lands amounts to 47,569,915 cubic feet, which represents 2.5 per cent of the primary growing stock, or 39.4 cubic feet per acre for the productive forest land. The annual allowable cut is 2.1 per cent of the primary

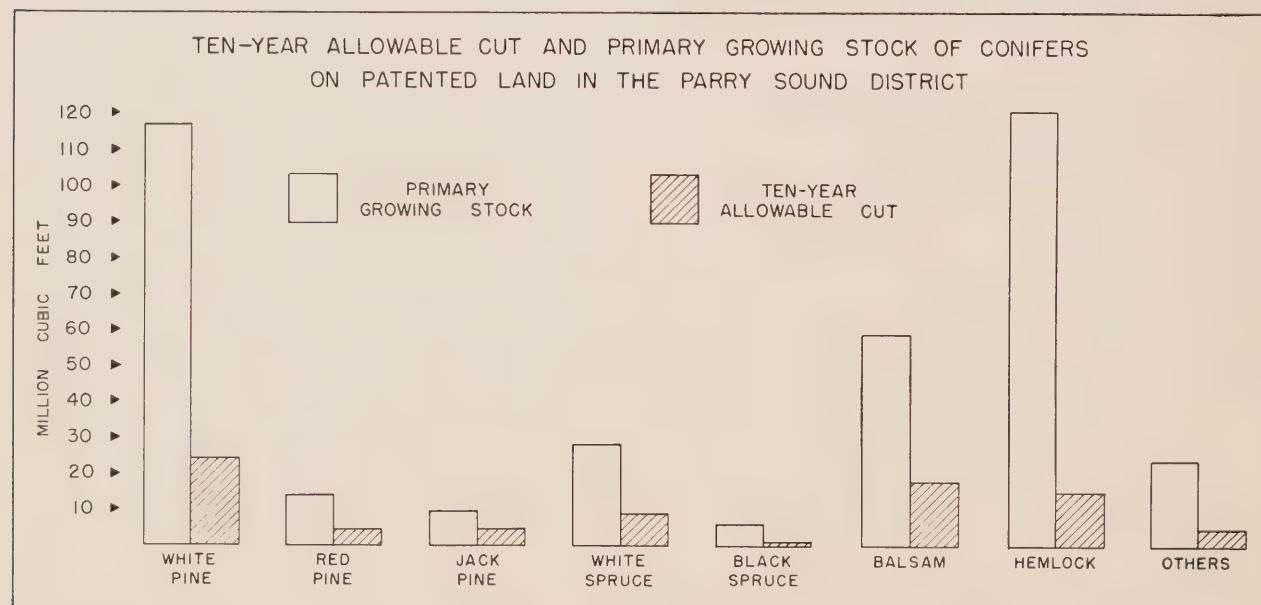


FIGURE 15

# TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LAND IN THE PARRY SOUND DISTRICT

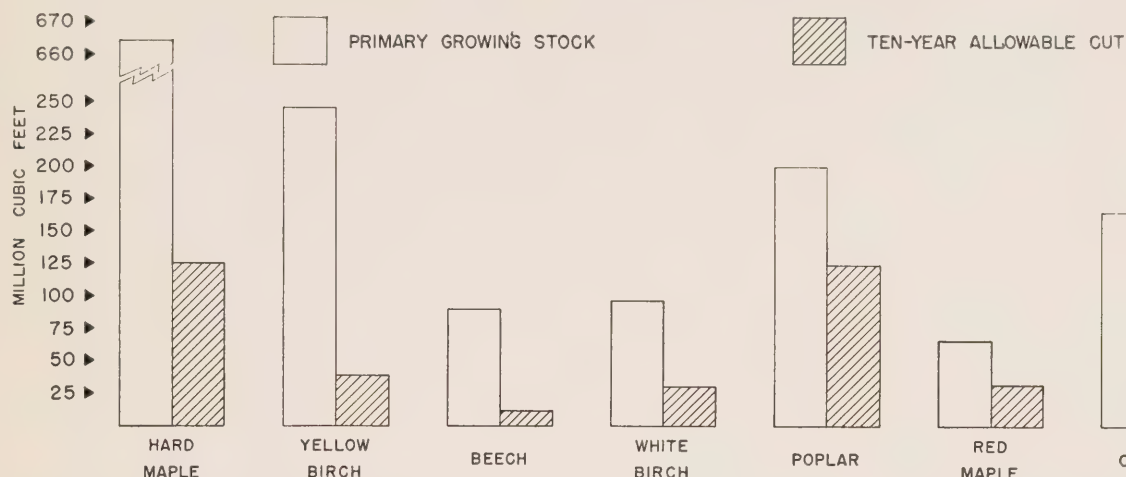


FIGURE 16

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Parry Sound district.*

Species	Annual allowable cut cu. ft.
White pine.....	82,660
Red pine.....	17,495
Jack pine.....	64,245
White spruce.....	175,870
Black spruce.....	38,125
Balsam fir.....	195,395
Hemlock.....	496,870
White cedar.....	77,795
Larch.....	370
<b>TOTAL CONIFERS.....</b>	<b>1,148,825</b>

TABLE 12. — *Annual allowable cut for hardwood species on Crown land*

Species	Annual allowable cut cu. ft.
Hard maple.....	4,007,285
Yellow birch.....	3,398,290
Beech.....	337,450
White elm.....	120,620
Ironwood.....	110,675
Red oak.....	65
White birch.....	81,755
Poplar (all).....	103,140
Red maple.....	206,925
Ash, white and black.....	101,040
Basswood.....	211,320
Black cherry.....	48,730
<b>TOTAL HARDWOODS.....</b>	<b>8,727,295</b>

growing stock for conifers and 2.6 per cent for hardwoods.

The annual allowable cut for coniferous species on patented lands is 8,125,155 cubic feet and for

hardwoods, 39,444,760 cubic feet. About one-half of the allowable cut is for hard maple and poplar, each of them contributing over 12 million cubic feet. For the coniferous species, white and red pine are the most important, contributing approximately 3 million cubic feet. Balsam fir is next in importance followed closely by hemlock and spruce. Other conifers appear in inappreciable volumes (figs. 15 and 16).

TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut cu. ft.
White pine.....	2,434,755
Red pine.....	434,310
Jack pine.....	443,280
White spruce.....	875,805
Black spruce.....	129,940
Balsam fir.....	1,840,595
Hemlock.....	1,516,655
White cedar.....	439,380
Larch.....	10,435
<b>TOTAL CONIFERS.....</b>	<b>8,125,155</b>
Hard maple.....	12,448,820
Yellow birch.....	3,832,800
Beech.....	1,130,400
White elm.....	618,390
Ironwood.....	414,795
Red oak.....	617,965
White birch.....	3,018,500
Poplar (all).....	12,464,120
Red maple.....	3,119,300
Ash, white and black.....	662,650
Basswood.....	831,120
Black cherry.....	285,900
<b>TOTAL HARDWOODS.....</b>	<b>39,444,760</b>

### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Returns for the years ending March 31, 1946-1949<sup>1</sup>, inclusive, the average annual amounts of wood and forest products were cut on Crown lands in the Parry Sound district as follows:

Logs and booms.....	29,757,430 F.B.M. Doyle rule
Logs.....	13,262 lineal feet
Building timber.....	19,471 lineal feet
Poles.....	1,982 pieces
Posts.....	3,554 pieces
Pulpwood.....	3,397 cords
Fuelwood.....	7,763 cords

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet (table 14) and are comparable with the figures for allowable cut (table 15).

A comparison of the annual allowable cut with the actual cut by species (table 15) indicates that utilization was, on the whole, more than the allowable cut. Heavy overcut may be noticed in white and red pine, hemlock, the two spruces, and balsam fir. Jack pine is being cut close to the allowable cut and only cedar and larch were cut less than the allowable cut permits (fig. 17). If white and red pine, spruce and hemlock are to be cut at the present rate, the existing mature timber will be exhausted in 3 years as regards pine, spruce in 9 years and hemlock in 7 years. At the end of these periods, utilization of

TABLE 14 — Gross total cubic volume of wood utilized annually in the Parry Sound district.

Species	Wood utilized cu. ft.	Total per cent
Pine, white and red.....	1,229,673	7.6
Jack pine.....	61,045	.4
Spruce, white and black.....	791,388	4.9
Balsam fir.....	313,174	2.0
Hemlock.....	6,991,638	43.4
Cedar and larch.....	19,532	.1
<b>TOTAL CONIFERS.....</b>	<b>9,406,450</b>	<b>58.4</b>
Hard maple.....	2,089,937	13.0
Birch, yellow and white.....	3,638,147	22.6
Poplar.....	440,166	2.7
Other hardwoods.....	544,904	3.3
<b>TOTAL HARDWOODS.....</b>	<b>6,713,154</b>	<b>41.6</b>
<b>TOTAL.....</b>	<b>16,119,604</b>	<b>100.0</b>

these species will cease until young stands become mature. In general, conifers were cut at a rate approximately 8 times the allowable cut, whereas the cut of hardwoods was 77 per cent of the allowable cut. Poplar, although shown as being over-utilized in the calculation of the allowable cut on Crown lands when only the mature age class is considered, will show a much larger allowable cut in the later part of the rotation. The volume of the primary growing stock of poplar in the mature age class is 1,719,000 cubic feet which if cut in one-third the rotation

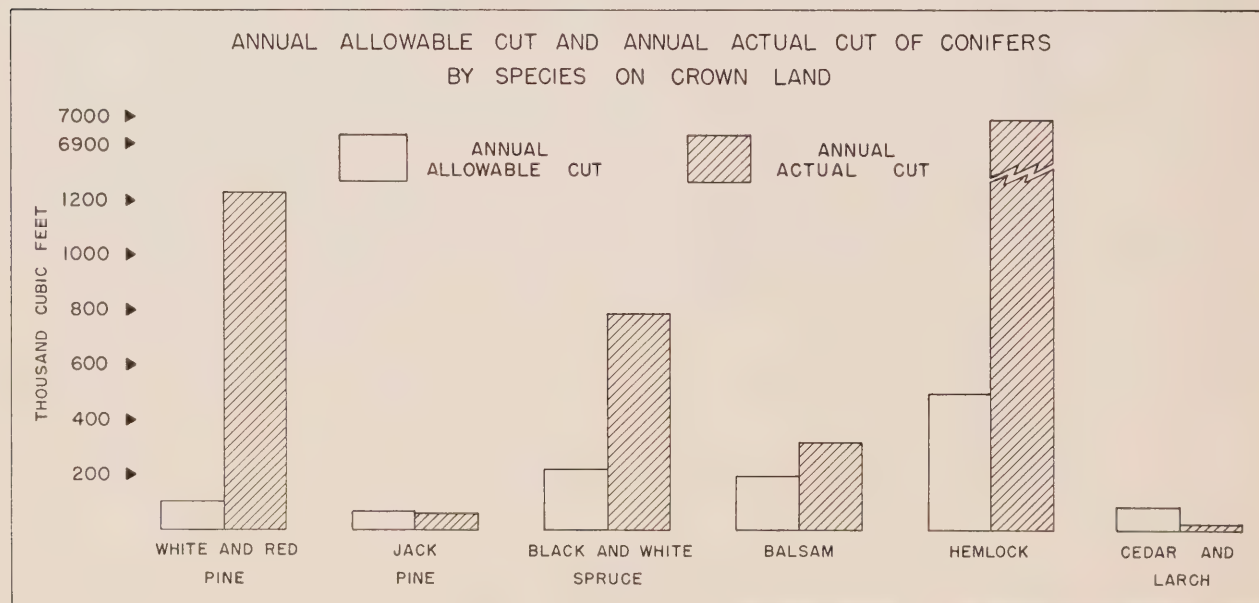


FIGURE 17

<sup>1</sup> Reports of the Minister of Lands and Forests, for the Province of Ontario, for the fiscal years ending March 31, 1947-1950.



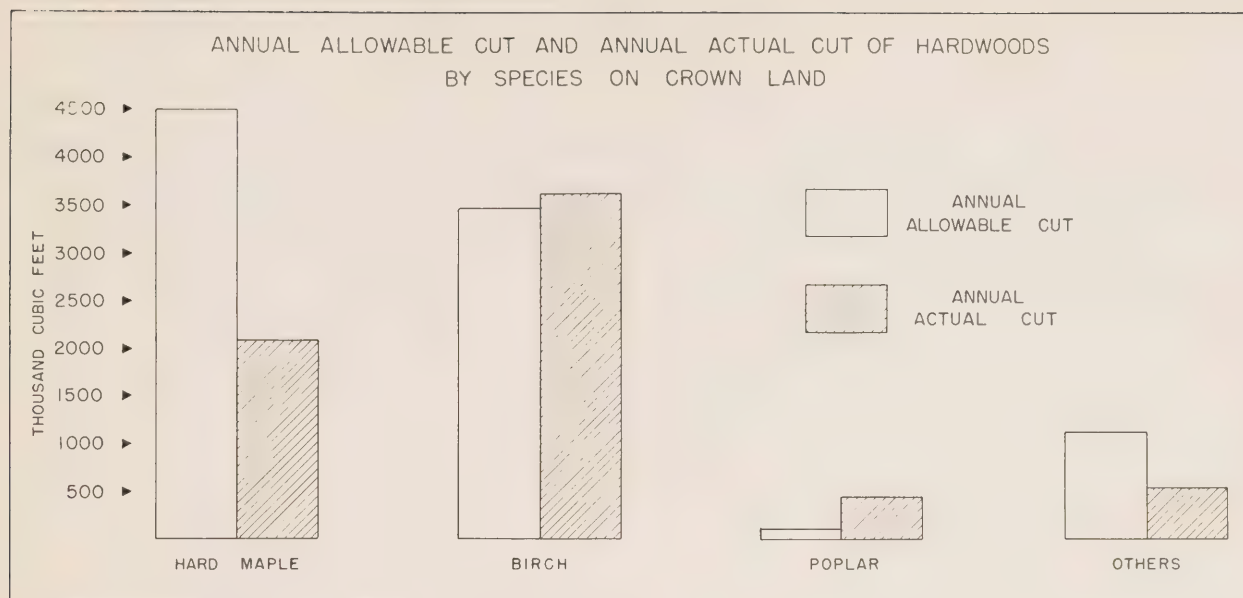


FIGURE 18

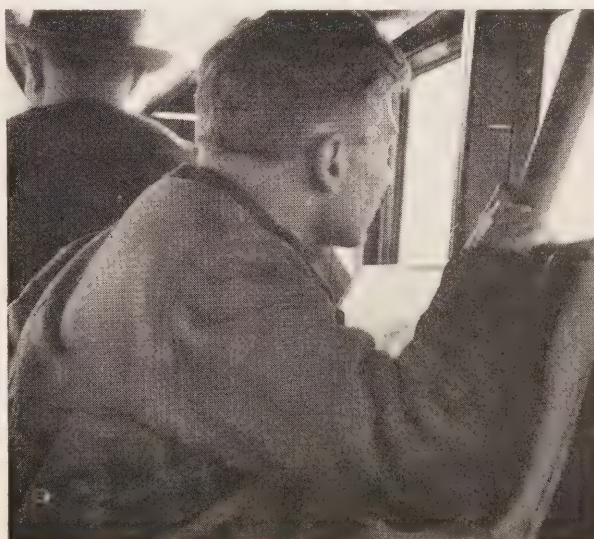
gives an allowable cut of 103,140 cubic feet per annum. The volume of poplar in the immature age class is 237,290,000 cubic feet which will be cut in the remaining two-thirds rotation. This gives an allowable cut of at least 7 million cubic feet per year of poplar in the latter two-thirds of the rotation period. Considering the mature and immature volumes together, all of which will be cut during the rotation of 50 years, the allowable cut for the whole rotation is over 4,780,000 cubic feet per annum. Since poplar is not readily marketable in large quan-

ties, all poplar marketable each year up to a total of nearly 5 million cubic feet may be utilized and be well within the over-all allowable cut for this species. Birch was a little over the allowable cut and all other hardwoods were cut less than the allowable cut permits (fig. 18).

There are no available records of the quantity of timber utilized from patented lands in the Parry Sound district, and, therefore, no comparison of the allowable with the actual cut is made.

TABLE 15. — Comparison of allowable cut with actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red.....	100	1,230
Jack pine.....	64	61
Spruce, white and black.....	214	791
Balsam fir.....	196	313
Hemlock.....	497	6,992
Cedar and larch.....	78	20
<b>TOTAL CONIFERS.....</b>	<b>1,149</b>	<b>9,407</b>
Hard maple.....	4,007	2,090
Birch.....	3,480	3,638
Poplar.....	103	440
Other hardwoods.....	1,137	545
<b>TOTAL HARDWOODS.....</b>	<b>8,727</b>	<b>6,713</b>
<b>TOTAL.....</b>	<b>9,876</b>	<b>16,120</b>



Sketching from aircraft.

# APPENDIX

## *Survey Methods*

● The forest resources inventory of the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal-length camera to produce photographs on a scale of four inches to the mile (1/15,840). Following the photography planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Systematic sampling was carried out by field crews who collected all the data necessary for the making of the volume estimates. On the completion of the field work finished forest type maps were prepared and areas determined by the usual methods.

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood, and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for the three different years during which field data was collected in this district. The per acre volumes in cubic feet, made up in this manner are shown in tables 18, 19 and 20.

The inventory for the Parry Sound district has been based upon the forest resources inventory data alone, and no maps or inventories from any other sources were used in the compilation work.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by dividing the total mature volume for each species by the respective rotation age. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 18 cubic feet per acre, and for patented land 29 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

## *Age Classes*

The age classes in their present form do not permit the usual method of arriving at sustained yield because there are no figures for areas by species, and each age class represents quite a range in years. The immature age class may have an age range from 10 to 150 years, the mature age class from 30 to 300 years, depending on the species. Therefore, no normal area for each age class can be arrived at.



*Pit props cut from the forests for the mining industry.*



## Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class Ib<sup>1</sup> were used as rotation ages for all species encountered, with the exception of jack pine, where a rotation age of seventy years has been accepted as more suitable than that of sixty years. In addition to these, the rotation age of one hundred years for white and black ash, ironwood and black cherry has been adopted arbitrarily (table 16).

In calculations of allowable cut, a higher rotation for Crown land was used than that for patented land. The adoption of the lower rotation in the case of patented land arises from the fact that patented lands are normally cut over at an earlier age than Crown lands.

TABLE 16. — *Rotation ages by species.*

Species	Crown land	Patented land
	Years	Years
White pine.....	120	90
Red pine.....	100	60
Jack pine.....	70	40
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
Hemlock.....	300	150
White cedar.....	200	100
Larch.....	100	75
Hard maple.....	200	100
Yellow birch.....	150	120
Beech.....	200	150
White elm.....	150	100
Ironwood.....	100	100
Red oak.....	200	100
White birch.....	80	60
Poplar (all).....	50	30
Red maple.....	70	40
White and black ash.....	100	100
Basswood.....	90	60
Black cherry.....	100	100

## Cull Factors

The cull factors (table 17) used in this report where it was found necessary to calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, or where it was necessary to calculate the merchantable volumes from the primary growing stock, were taken from figures for defect made available from operations being carried out in the Parry Sound and Algonquin districts.

<sup>1</sup> Manual of Timber Management, Dept. of Lands and Forests, Ontario — Part II, page 50.

<sup>2</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.

TABLE 17 — *Cull factors by species, Parry Sound district.*

Species	Cull per cent
Pine, white and red.....	27.5
Jack pine.....	35.0
Spruce.....	20.0
Balsam fir.....	65.0
Hemlock.....	50.0
Cedar.....	35.0
Larch.....	35.0
Hard maple.....	35.0
Birch.....	10.0
Beech.....	50.0
Elm.....	50.0
Oak.....	50.0
Poplar.....	20.0
Ash.....	30.0
Basswood.....	50.0
Black cherry.....	50.0

## Allowable Cut

### (a) METHOD

The following two bases were available for calculation of allowable cut: (1) the volumes of the mature and immature age classes for each species, and (2) the adopted rotation ages.

The compilation was carried out in such a way that the volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary growing stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>2</sup> was considered and found to be satisfactory, for the following reasons: (1) The ratio of the volume per acre of mature to immature age class has been actually found, so far in Ontario, to be approximately 5/3 required by the French method. (2) In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. (3) The French method is recognized as sound enough, though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.



## (b) FORMULA

In the present calculations, the following formulae were used:

$$(1) \text{ Crown land } \rightarrow P = \frac{V.1.}{n/3}$$
$$(2) \text{ Patented land } \rightarrow P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I)  
V.2. — denotes volume of immature timber (Age Class II)  
n — denotes rotation  
P — denotes annual allowable cut.

The decision to use formula (1) for Crown lands was made for the following reasons. The area of mature stands in the Parry Sound district is only 11 per cent of productive forest area, which indicates a deficit of mature timber and, consequently, need of reducing the annual cut. The immature age class shows, in contrast to the mature, a considerable surplus in area. However, before the immature stands become mature, at least a period equal to approximately one-third of rotation may elapse. Therefore, the presently mature stock can be used up gradually only within the said period of one-third of the rotation before a new mature timber stand will appear on the area and will be ready for utilization. Cutting of immature timber on Crown lands to regulate the yield is not indicated inasmuch

as it is the practice in Ontario to limit utilization on Crown lands to mature timber. In accordance with the foregoing, formula (1) was used in the calculation of the annual allowable cut for Crown lands, whereby only mature timber shall be cut during the initial period, on expiration of which a new mature stand will become available for utilization.

The patented lands call for a different solution to the problem of regulating yield where formula (2) was used. The deficit of mature and surplus of immature age class is even greater than on Crown lands. Taking this into consideration as well as the heavy demand for wood in a relatively densely populated area it may be assumed that the considerable needs for wood will be met in no other way than by cutting a portion of the immature stands. For that reason both the mature and immature volumes were included in the calculations of allowable cut for patented lands with the view to obtaining a balanced yield over a period of approximately two-thirds rotation.

With the aid of the formulae in question, the allowable cut has been calculated for each species, separately, with full consideration of the actual growing stock of each species and the appropriate rotation.

The results of individual calculations for each species have been totalled and shown as allowable cut for Crown lands and for patented lands, respectively.

### *Common and Botanical Names of Tree Species included in Timber Estimates*

#### CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill.) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
Hemlock.....	<i>Tsuga canadensis</i> (L.) Carr.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

#### HARDWOODS

Hard maple.....	<i>Acer saccharum</i> Marsh.
-----------------	------------------------------

Yellow birch.....	<i>Betula lutea</i> Michx. f.
Beech.....	<i>Fagus grandifolia</i> Erhr.
White elm.....	<i>Ulmus americana</i> L.
Ironwood.....	<i>Ostrya virginiana</i> (Mill.) K. Koch.
Red oak.....	<i>Quercus borealis</i> Michx. f.
Red maple.....	<i>Acer rubrum</i> L.
White ash.....	<i>Fraxinus americana</i> L.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
Basswood.....	<i>Tilia glabra</i> Vent.
Black cherry.....	<i>Prunus serotina</i> Ehrh.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.

TABLE 18. — *Volume of the primary growing stock in cubic feet per acre.**Algonquin Section — 1947-1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>	1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>
White pine.....	4''-9'' 10'' up	23.1 307.0	22.6 300.8	19.8 262.7	..... 267.8	224.0 242.6	211.1 228.7	163.9 177.5	.....
Red pine.....	4''-9'' 10'' up	.....	.....	.....	.....	139.0 104.8	131.0 98.9	101.7 76.7	.....
Jack pine.....	4''-9'' 10'' up	.....	.....	.....	141.9 19.3	109.8 15.0	103.5 14.1	80.3 11.0	70.1 46.8
White spruce.....	4''-9'' 10'' up	19.1 93.4	18.7 91.5	16.4 79.9	.....	94.0 42.3	88.7 39.8	68.9 30.9	55.3
Black spruce.....	4''-9'' 10'' up	117.5 17.6	115.1 17.2	100.6 15.0	42.1 103.0	143.6 19.6	135.3 18.5	105.1 14.3	254.1
Balsam fir.....	4''-9'' 10'' up	76.1 11.4	74.6 11.1	65.2 9.7	59.5	82.1 6.2	77.5 5.8	60.1 4.5	24.5
Hemlock.....	4''-9'' 10'' up	181.1 771.8	177.3 756.1	154.9 660.5	.....	142.6 116.6	134.4 110.0	104.3 85.4	.....
White cedar.....	4''-9'' 10'' up	74.1 316.1	72.6 309.6	63.4 270.4	266.2 98.4	104.8 69.9	98.8 65.9	76.7 51.2	136.5
TOTAL CONIFERS.....	4''-9'' 10'' up	491.0 1517.3	480.9 1486.3	420.3 1298.2	509.7 488.5	1039.9 617.0	980.3 581.7	761.0 451.5	540.5 46.8
Hard maple.....	4''-9'' 10'' up	2.8 12.2	2.8 11.9	2.4 10.4	.....	.....	.....	.....	34.3
Yellow birch.....	4''-9'' 10'' up	18.2 209.4	17.8 205.2	15.6 179.1	8.7	6.5 31.9	6.2 30.0	4.8 23.3	.....
White birch.....	4''-9'' 10'' up	38.7 176.4	37.9 172.8	33.1 150.9	51.3 181.8	61.3 50.1	57.8 47.2	44.8 36.7	37.8
Poplar (all).....	4''-9'' 10'' up	5.4 12.1	5.3 11.9	4.6 10.4	.....	55.0 46.8	51.8 44.1	40.2 34.3	40.6
Red maple.....	4''-9'' 10'' up	12.4 5.1	12.2 5.0	10.6 4.4	.....	10.9 0.6	10.4 0.5	8.0 0.4	.....
TOTAL HARDWOODS.....	4''-9'' 10'' up	77.5 415.2	76.0 406.8	66.3 355.2	60.0 181.8	133.7 129.4	126.2 121.8	97.8 94.7	112.7
GRAND TOTAL.....	4''-9'' 10'' up	568.5 1932.5	556.9 1893.1	486.6 1653.4	569.7 670.3	1173.6 746.4	1106.5 703.5	858.8 546.2	653.2 46.8
TOTAL 4'' UP.....		2501.0	2450.0	2140.0	1240.0	1920.0	1810.0	1405.0	700.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>	1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>
White pine.....	4''-9'' 10'' up	.....	.....	.....	.....	7.4 18.1	6.9 16.8	5.2 12.8	.....
White spruce.....	4''-9'' 10'' up	3.1 13.9	2.7 12.4	2.1 9.8	.....	10.0 10.4	9.3 9.7	7.1 7.3	.....
Balsam fir.....	4''-9'' 10'' up	17.7 2.7	15.7 2.4	12.4 1.9	7.8 11.8	23.2 2.3	21.6 2.1	16.4 1.6	3.4 5.2
Hemlock.....	4''-9'' 10'' up	23.7 74.9	21.0 66.4	16.6 52.4	.....	7.3 13.1	6.8 12.2	5.2 9.2	.....
White cedar.....	4''-9'' 10'' up	12.4 11.4	11.0 10.1	8.7 8.0	1.2 58.6	7.0 10.0	6.5 9.3	4.9 7.1	0.5 25.8
TOTAL CONIFERS.....	4''-9'' 10'' up	56.9 102.9	50.4 91.3	39.8 72.1	9.0 70.4	54.9 53.9	51.1 50.1	38.8 38.0	3.9 31.0
Hard maple.....	4''-9'' 10'' up	269.3 1413.7	238.8 1253.6	188.5 989.5	225.3 49.5	107.9 126.7	100.5 118.0	76.2 89.4	99.0 21.7
Yellow birch.....	4''-9'' 10'' up	64.0 850.6	56.8 754.2	44.8 595.4	68.4 68.4	33.3 85.7	31.0 79.8	23.5 60.5	30.0 30.1
Beech.....	4''-9'' 10'' up	.....	.....	.....	.....	8.7 6.6	8.1 6.1	6.2 4.6	.....
White elm.....	4''-9'' 10'' up	8.3 83.5	7.3 74.1	5.8 58.5	.....	.....	.....	.....	.....
Hornbeam.....	4''-9'' 10'' up	22.6 4.6	20.0 4.1	15.8 3.2	.....	17.8 0.9	16.5 0.9	12.5 0.7	.....

TABLE 18 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>	1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>
Red oak.....	4"-9" 10" up	2.2 18.2	2.0 16.1	1.6 12.7	.....	24.9 7.4	23.2 6.9	17.6 5.2	.....
White birch.....	4"-9" 10" up	49.0 104.0	43.4 92.3	34.3 72.8	138.0 .....	352.1 18.5	327.8 17.3	248.5 13.1	60.6 .....
Poplar (all).....	4"-9" 10" up	68.2 132.4	60.5 117.4	47.7 92.7	377.7 46.7	546.6 145.3	509.1 135.3	385.8 102.6	165.8 20.5
Red maple.....	4"-9" 10" up	10.7 6.3	9.5 5.6	7.5 4.4	32.5 35.3	35.8 8.4	33.4 7.8	25.3 5.9	14.3 15.5
Black ash.....	4"-9" 10" up	28.5 63.3	25.2 56.2	19.9 44.4	28.8 .....	30.3 25.8	28.2 24.0	21.4 18.2	12.6 .....
Basswood.....	4"-9" 10" up	7.8 33.0	6.9 29.3	5.4 23.2	.....	3.3 5.2	3.1 4.8	2.3 3.7	.....
TOTAL HARDWOODS.....	4"-9" 10" up	530.6 2709.6	470.4 2402.9	371.3 1896.8	870.7 199.9	1160.7 430.5	1080.9 400.9	819.3 303.9	382.3 87.8
GRAND TOTAL.....	4"-9" 10" up	587.5 2812.5	520.8 2494.2	411.1 1968.9	879.7 270.3	1215.6 484.4	1132.0 451.0	858.1 341.9	386.2 118.8
TOTAL 4" UP.....		3400.0	3015.0	2380.0	1150.0	1700.0	1583.0	1200.0	505.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>	1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>
White pine.....	4"-9" 10" up	7.4 74.6	7.0 71.0	5.8 59.1	.....	149.8 64.2	141.3 60.6	116.8 50.1	97.1 158.4
Red pine.....	4"-9" 10" up	1.8 7.7	1.7 7.3	1.4 6.1	.....	35.5 14.5	33.5 13.7	27.7 11.3	.....
White spruce.....	4"-9" 10" up	29.2 87.5	27.8 83.2	23.1 69.2	.....	91.1 44.9	86.0 42.3	71.1 35.0	30.1 35.3
Black spruce.....	4"-9" 10" up	0.9 2.3	0.8 2.2	0.7 1.8	.....	24.6 5.4	23.2 5.1	19.2 4.2	.....
Balsam fir.....	4"-9" 10" up	67.3 17.9	64.0 17.0	53.2 14.2	107.4 84.3	119.0 5.0	112.3 4.7	92.8 3.9	103.7 .....
Hemlock.....	4"-9" 10" up	126.0 615.4	119.9 585.3	99.7 486.6	.....	79.0 89.0	74.5 84.0	61.6 69.4	64.6 .....
White cedar.....	4"-9" 10" up	59.2 152.2	56.3 144.8	46.8 120.4	24.2 148.6	57.3 64.7	54.1 61.0	44.7 50.5	41.6 21.4
TOTAL CONIFERS.....	4"-9" 10" up	291.8 957.6	277.5 910.8	230.7 757.4	131.5 232.9	556.3 287.7	524.9 271.4	433.9 224.4	337.1 215.1
Hard maple.....	4"-9" 10" up	82.5 261.4	78.5 248.6	65.3 206.7	.....	26.3 29.7	24.8 28.0	20.5 23.2	.....
Yellow birch.....	4"-9" 10" up	68.9 915.5	65.5 870.9	54.5 723.8	985.5 .....	27.7 126.3	26.2 119.1	21.6 98.5	.....
Hornbeam.....	4"-9" 10" up	5.9 0.4	5.6 0.4	4.7 0.3	.....	3.5 0.5	3.3 0.5	2.7 0.4	.....
Red oak.....	4"-9" 10" up	.....	.....	.....	.....	17.6 4.4	16.6 4.2	13.8 3.4	.....
White birch.....	4"-9" 10" up	43.5 212.1	41.3 201.8	34.4 167.7	.....	234.7 91.3	221.5 86.1	183.1 71.2	149.2 .....
Poplar (all).....	4"-9" 10" up	57.7 128.4	54.9 122.2	45.6 101.6	.....	369.4 136.6	348.5 128.9	288.1 106.5	52.7 .....
Red maple.....	4"-9" 10" up	22.1 22.1	21.0 21.0	17.5 17.4	.....	34.0 8.0	32.1 7.5	26.6 6.2	43.9 .....
Black ash.....	4"-9" 10" up	31.7 28.2	30.2 26.8	25.1 22.3	.....	26.2 19.8	24.7 18.7	20.5 15.4	.....
Basswood.....	4"-9" 10" up	2.8 22.4	2.6 21.4	2.2 17.8	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9" 10" up	315.1 1590.5	299.6 1513.1	249.3 1257.6	985.5 .....	739.4 416.6	697.7 393.0	576.9 324.8	245.8 .....
GRAND TOTAL.....	4"-9" 10" up	606.9 2548.1	577.1 2423.9	480.0 2015.0	131.6 1218.4	1295.7 704.3	1222.6 664.4	1010.8 549.2	582.9 215.1
TOTAL 4" UP.....		3155.0	3001.0	2495.0	1350.0	2000.0	1887.0	1560.0	798.0



TABLE 19. — Volume of the primary growing stock in cubic feet per acre.

Algonquin Section — 1949

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine	4"-9"	113.3	96.5	65.2	25.7	404.6	353.1	247.2	97.0
	10" up	426.2	363.1	245.5	96.5	660.1	576.1	403.3	158.2
Red pine	4"-9"	99.4	84.6	57.2	22.5	230.0	200.7	140.5	55.1
	10" up	162.1	138.1	93.4	36.7	195.9	171.0	119.7	47.0
Jack pine	4"-9"	164.3	140.0	94.6	37.2	132.3	115.5	80.9	31.7
	10" up	292.2	248.9	168.3	66.2	16.4	14.3	10.0	3.9
White spruce	4"-9"	52.9	45.0	30.4	12.0	119.0	103.8	77.7	28.5
	10" up	353.8	301.4	203.8	80.1	151.4	132.2	92.5	36.3
Black spruce	4"-9"	259.0	220.6	149.1	58.6	89.8	78.4	54.9	21.5
	10" up	64.7	55.1	37.3	14.7	18.4	16.0	11.2	4.4
Balsam fir	4"-9"	102.3	87.1	58.9	23.2	270.3	236.0	165.1	64.8
	10" up	80.3	68.4	46.3	18.2	44.0	38.4	26.9	10.5
Hemlock	4"-9"	94.5	80.5	54.4	21.4	39.9	34.8	24.4	9.6
	10" up	764.6	651.2	440.3	173.2	159.5	139.3	97.4	38.2
White cedar	4"-9"	225.1	191.8	129.6	51.0	142.0	123.9	86.7	34.0
	10" up	418.1	356.1	240.8	94.7	111.5	97.3	68.2	26.8
Larch	4"-9"	.....	.....	.....	.....	33.9	29.5	20.7	8.1
	10" up	.....	.....	.....	.....	3.3	2.9	2.0	0.8
TOTAL CONIFERS	4"-9"	1110.8	946.1	639.4	251.6	1461.8	1275.7	893.1	350.3
	10" up	2562.0	2182.3	1475.7	580.3	1360.5	1187.5	831.2	326.1
Hard maple	4"-9"	13.7	11.7	7.9	3.1	13.2	11.5	8.0	3.2
	10" up	77.6	66.1	44.7	17.6	20.6	18.0	12.6	4.9
Yellow birch	4"-9"	40.3	34.4	23.2	9.1	24.3	21.2	14.9	5.8
	10" up	183.8	156.5	105.8	41.6	127.8	111.6	78.0	30.6
Beech	4"-9"	4.5	3.8	2.6	1.0	.....	.....	.....	.....
	10" up	3.8	3.3	2.2	0.9	.....	.....	.....	.....
White elm	4"-9"	.....	.....	.....	.....	2.4	2.1	1.4	0.6
	10" up	.....	.....	.....	.....	4.4	3.8	2.7	1.0
Red oak	4"-9"	.....	.....	.....	.....	12.1	10.5	7.4	2.9
	10" up	.....	.....	.....	.....	11.6	10.1	7.1	2.8
White birch	4"-9"	12.8	10.9	7.4	2.9	84.7	74.0	51.8	20.3
	10" up	3.8	3.2	2.2	0.9	43.7	38.1	26.7	10.5
Poplar (all)	4"-9"	44.8	38.2	25.8	10.2	57.5	50.2	35.2	13.8
	10" up	50.6	43.1	29.2	11.4	98.0	85.5	59.8	23.4
Red maple	4"-9"	.....	.....	.....	.....	22.7	19.8	13.9	5.5
	10" up	.....	.....	.....	.....	4.3	3.8	2.6	1.0
Black ash	4"-9"	15.8	13.5	9.1	3.6	12.8	11.2	7.8	3.1
	10" up	25.7	21.9	14.8	5.8	17.6	15.4	10.8	4.2
TOTAL HARDWOODS	4"-9"	131.9	112.5	76.0	29.9	229.7	200.5	140.4	55.2
	10" up	345.3	294.1	198.9	78.2	328.0	286.3	200.3	78.4
GRAND TOTAL	4"-9"	1242.7	1058.6	715.4	281.5	1691.5	1476.2	1033.5	405.5
	10" up	2907.3	2476.4	1674.6	658.5	1688.5	1473.8	1031.5	404.5
TOTAL 4" UP		4150.0	3535.0	2390.0	940.0	3380.0	2950.0	2065.0	810.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine	4"-9"	.....	.....	.....	.....	12.2	11.1	8.6	.....
	10" up	.....	.....	.....	.....	34.9	31.6	24.6	.....
White spruce	4"-9"	3.8	3.8	3.6	.....	6.8	6.2	4.8	3.3
	10" up	20.1	19.8	18.7	.....	9.8	8.9	6.9	.....
Balsam fir	4"-9"	14.9	14.6	13.8	6.6	33.0	29.9	23.3	22.6
	10" up	2.2	2.2	2.1	.....	5.8	5.3	4.1	16.4
Hemlock	4"-9"	18.0	17.8	16.8	.....	11.8	10.7	8.3	2.8
	10" up	94.5	93.2	88.5	.....	57.4	52.1	40.6	17.1
White cedar	4"-9"	2.8	2.7	2.6	.....	.....	.....	.....	.....
	10" up	7.4	7.4	7.0	.....	.....	.....	.....	.....
TOTAL CONIFERS	4"-9"	39.5	38.9	36.8	6.6	63.8	57.9	45.0	28.7
	10" up	124.2	122.6	116.3	.....	107.9	97.9	76.2	33.5
Hard maple	4"-9"	311.5	307.3	291.4	84.3	402.4	364.9	284.0	91.4
	10" up	1635.6	1613.5	1530.1	563.9	855.2	775.5	603.6	479.7
Yellow birch	4"-9"	45.0	44.4	42.1	45.8	80.9	73.3	57.1	4.5
	10" up	1080.3	1065.7	1010.6	1480.6	323.5	293.4	228.3	17.9
Beech	4"-9"	47.3	46.6	44.2	.....	45.7	41.4	32.3	.....
	10" up	95.9	94.7	89.8	.....	92.8	84.2	65.5	.....
White elm	4"-9"	0.5	0.5	0.5	.....	17.3	15.7	12.2	18.1
	10" up	2.9	2.9	2.7	.....	27.0	24.5	19.1	94.8
Ironwood	4"-9"	15.6	15.4	14.5	.....	37.0	33.6	26.1	.....
	10" up	4.9	4.8	4.6	.....	4.6	4.1	3.2	.....

TABLE 19 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Red oak.....	4"-9" 10" up	.....	.....	.....	.....	24.8 14.0	22.5 12.7	17.5 9.9	7.5
White birch.....	4"-9" 10" up	.....	.....	.....	.....	126.3 84.2	114.5 76.4	89.2 59.4	.....
Poplar (all).....	4"-9" 10" up	.....	.....	.....	.....	213.0 130.5	193.1 118.4	150.3 92.1	.....
Red maple.....	4"-9" 10" up	.....	.....	.....	.....	22.3 8.2	20.1 7.5	15.7 5.8	.....
Black ash.....	4"-9" 10" up	.....	.....	.....	.....	10.9 11.3	9.8 10.3	7.6 8.0	1.6 15.8
Basswood.....	4"-9" 10" up	0.7 6.1	0.7 6.0	0.7 5.7	.....	7.5 34.0	6.8 30.9	5.3 24.0	.....
Black cherry.....	4"-9" 10" up	.....	.....	.....	8.8	18.9 6.0	17.2 5.4	13.4 4.2	23.4 13.1
TOTAL HARDWOODS.....	4"-9" 10" up	420.6 2825.7	414.9 2787.6	393.4 2643.5	138.9 2044.5	1007.0 1591.3	912.9 1443.3	710.7 1123.1	146.5 621.3
GRAND TOTAL.....	4"-9" 10" up	460.1 2949.9	453.8 2910.2	430.2 2759.8	145.5 2044.5	1070.8 1699.2	970.8 1541.2	755.7 1199.3	175.2 654.8
TOTAL 4" UP.....		3410.0	3364.0	3190.0	2190.0	2770.0	2512.0	1955.0	830.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	14.2 114.8	12.7 103.0	9.7 78.6	4.4 35.5	177.8 266.8	165.1 247.6	130.4 195.6	52.1 46.2
Red pine.....	4"-9" 10" up	.....	.....	.....	.....	38.8 60.6	36.0 56.3	28.4 44.5	6.7 26.8
White spruce.....	4"-9" 10" up	25.7 86.1	23.0 77.2	17.6 59.0	8.0 26.6	64.4 64.3	59.8 59.7	47.2 47.2	6.5
Black spruce.....	4"-9" 10" up	.....	.....	.....	.....	18.7 4.7	17.4 4.3	13.8 3.4	.....
Balsam fir.....	4"-9" 10" up	90.3 17.2	81.0 15.4	61.8 11.8	27.9 5.3	186.4 18.4	172.9 17.1	136.7 13.5	60.5
Hemlock.....	4"-9" 10" up	142.0 950.2	127.3 851.9	97.2 650.8	43.9 293.9	53.2 151.6	49.4 140.6	39.1 111.1	34.0 178.8
White cedar.....	4"-9" 10" up	40.9 79.5	36.7 71.2	28.1 54.4	12.6 24.6	40.3 38.7	37.4 35.9	29.5 28.4	.....
TOTAL CONIFERS.....	4"-9" 10" up	313.1 1247.8	280.7 1118.7	214.4 854.6	96.8 385.9	579.6 605.1	538.0 561.5	425.1 443.7	159.8 251.8
Hard maple.....	4"-9" 10" up	119.9 585.3	107.5 524.7	82.1 400.9	37.1 181.0	104.4 202.7	96.9 188.2	76.6 148.6	54.9 288.5
Yellow birch.....	4"-9" 10" up	78.9 1499.2	70.7 1344.1	54.0 1026.8	24.4 463.7	55.7 271.9	51.7 252.4	40.8 199.4	6.3 120.0
Beech.....	4"-9" 10" up	18.4 37.5	16.5 33.6	12.6 25.7	5.7 11.6	8.4 9.1	7.8 8.5	6.2 6.7	.....
White elm.....	4"-9" 10" up	.....	.....	.....	.....	8.4 9.1	7.8 8.5	6.2 6.7	.....
Ironwood.....	4"-9" 10" up	9.3 3.6	8.4 3.2	6.3 2.5	2.9 1.1	10.6 1.1	9.9 1.0	7.8 0.8	.....
Red oak.....	4"-9" 10" up	.....	.....	.....	.....	12.9 7.6	12.0 7.0	9.4 5.6	.....
White birch.....	4"-9" 10" up	36.1 114.4	32.4 102.5	24.7 78.4	11.2 35.4	270.5 127.3	251.1 118.1	198.4 93.3	6.5
Poplar (all).....	4"-9" 10" up	31.9 49.8	28.5 44.7	21.8 34.2	9.9 15.4	235.6 288.0	218.7 267.3	172.8 211.2	49.8 88.4
Red maple.....	4"-9" 10" up	9.8 16.0	8.8 14.3	6.7 11.0	3.0 5.0	30.0 8.0	27.9 7.4	22.0 5.9	32.9 21.1
Black ash.....	4"-9" 10" up	25.5 43.3	22.8 38.9	17.4 29.7	7.9 13.4	30.3 37.0	28.1 34.4	22.2 27.1	.....
Basswood.....	4"-9" 10" up	2.4 57.8	2.2 51.8	1.6 39.6	0.7 17.9	2.2 6.6	2.0 6.1	1.6 4.8	.....
Black cherry.....	4"-9" 10" up	.....	.....	.....	.....	2.5 0.4	2.3 0.4	1.8 0.3	.....
TOTAL HARDWOODS.....	4"-9" 10" up	332.2 2406.9	297.8 2157.8	227.2 1648.8	102.8 744.5	771.5 968.8	716.2 899.3	565.8 710.4	150.4 518.0
GRAND TOTAL.....	4"-9" 10" up	645.3 3654.7	578.5 3276.5	441.6 2503.4	199.6 1130.4	1351.1 1573.9	1254.2 1460.8	990.9 1154.1	310.2 769.8
TOTAL 4" UP.....		4300.0	3855.0	2945.0	1330.0	2925.0	2715.0	2145.0	1080.0

TABLE 20. — *Volume of the primary growing stock in cubic feet per acre.*  
*Algonquin Section — 1950*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	59.4	56.3	44.2	18.6	178.4	166.6	119.1	21.3
	10" up	144.1	136.5	107.2	45.1	404.7	378.0	270.0	97.9
Red pine.....	4"-9"	18.0	17.1	13.4	5.6	2.4	2.2	1.6	2.4
	10" up	.....	.....	.....	.....	11.2	10.5	7.5	10.1
Jack pine.....	4"-9"	277.4	262.9	206.4	86.8	93.1	87.0	62.1	379.3
	10" up	72.9	69.1	54.2	22.8	6.7	6.2	4.5	45.0
White spruce.....	4"-9"	35.0	33.2	26.0	10.9	55.6	51.9	37.1	.....
	10" up	26.8	25.4	20.0	8.4	91.9	85.8	61.3	.....
Black spruce.....	4"-9"	109.4	103.7	81.4	34.2	74.3	69.3	49.6	.....
	10" up	202.3	191.7	150.4	63.3	25.5	23.9	17.0	.....
Balsam fir.....	4"-9"	102.1	96.7	75.9	31.9	271.0	253.1	180.8	.....
	10" up	62.8	59.5	46.7	19.7	37.6	35.2	25.1	.....
Hemlock.....	4"-9"	116.7	110.6	86.8	36.5	134.9	126.0	90.0	.....
	10" up	249.1	236.0	185.3	78.0	166.9	155.9	111.4	.....
White cedar.....	4"-9"	106.1	100.5	78.9	33.2	162.0	151.2	108.1	.....
	10" up	82.0	77.7	61.0	25.6	126.2	117.9	84.2	.....
Larch.....	4"-9"	7.7	7.3	5.7	2.4	.....	.....	.....	3.7
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9"	831.8	788.3	618.7	260.1	971.7	907.3	648.4	406.7
	10" up	840.0	795.9	624.8	262.9	870.7	813.4	581.0	153.0
Hard maple.....	4"-9"	6.5	6.2	4.8	2.0	7.3	6.8	4.9	.....
	10" up	253.7	240.3	188.7	79.4	6.3	5.9	4.2	.....
Yellow birch.....	4"-9"	11.5	10.9	8.6	3.6	31.9	29.7	21.3	.....
	10" up	202.3	191.7	150.4	63.3	115.6	108.0	77.1	.....
White elm.....	4"-9"	.....	.....	.....	.....	.....	.....	.....	.....
	10" up	154.6	146.5	115.0	48.4	.....	.....	.....	.....
White birch.....	4"-9"	2.7	2.6	2.0	0.9	39.0	36.4	26.0	14.1
	10" up	25.6	24.3	19.1	8.0	42.7	39.9	28.5	5.9
Poplar (all).....	4"-9"	61.2	58.0	45.5	19.2	40.1	37.5	26.8	32.8
	10" up	101.1	95.8	75.2	31.6	52.9	49.4	35.3	11.5
Red maple.....	4"-9"	29.3	27.7	21.8	9.1	30.4	28.4	20.3	.....
	10" up	17.1	16.2	12.7	5.4	21.8	20.3	14.5	.....
B. & W. Ash.....	4"-9"	27.5	26.1	20.4	8.6	19.9	18.6	13.3	.....
	10" up	11.1	10.5	8.3	3.5	14.1	13.2	9.4	.....
Basswood.....	4"-9"	.....	.....	.....	.....	2.5	2.2	1.6	.....
	10" up	.....	.....	.....	.....	2.1	2.0	1.4	.....
TOTAL HARDWOODS.....	4"-9"	138.7	131.5	103.1	43.4	171.1	159.6	114.2	46.9
	10" up	765.5	725.3	569.4	239.6	255.5	238.7	170.4	17.4
GRAND TOTAL.....	4"-9"	970.5	919.8	721.8	303.5	1142.8	1066.9	762.6	453.6
	10" up	1605.5	1521.2	1194.2	502.5	1126.2	1052.1	751.4	170.4
TOTAL 4" UP.....		2576.0	2441.0	1916.0	806.0	2269.0	2119.0	1514.0	624.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	.....	.....	.....	.....	5.1	5.0	4.2	12.2
	10" up	.....	.....	.....	.....	22.1	21.7	18.0	31.8
White spruce.....	4"-9"	1.3	1.2	1.0	0.5	1.2	1.1	1.0	.....
	10" up	9.4	9.2	7.8	3.6	1.1	1.1	0.9	.....
Balsam fir.....	4"-9"	21.5	21.0	17.8	8.3	15.6	15.4	12.8	2.3
	10" up	3.4	3.3	2.8	1.3	2.5	2.4	2.0	.....
Hemlock.....	4"-9"	31.7	30.9	26.3	12.2	21.8	21.3	17.8	4.3
	10" up	146.3	142.6	121.2	56.6	57.6	56.5	47.1	15.4
TOTAL CONIFERS.....	4"-9"	54.5	53.1	45.1	21.0	43.7	42.8	35.8	18.8
	10" up	159.1	155.1	131.8	61.5	83.3	81.7	68.0	47.2
Hard maple.....	4"-9"	332.6	324.2	275.5	128.5	407.2	399.3	332.7	50.8
	10" up	1579.1	1539.2	1308.1	609.9	670.1	657.1	547.5	66.8
Yellow birch.....	4"-9"	39.0	38.0	32.3	15.1	57.1	56.0	46.6	9.9
	10" up	911.5	888.5	755.1	352.0	158.4	155.3	129.4	7.6
Beech.....	4"-9"	52.3	51.0	43.3	20.2	53.0	52.0	43.4	.....
	10" up	140.0	136.4	116.0	54.0	142.0	139.3	116.0	.....
White elm.....	4"-9"	11.2	10.9	9.3	4.3	20.4	20.0	16.7	7.6
	10" up	67.1	65.4	55.6	26.0	36.3	35.6	29.6	.....
Hornbeam.....	4"-9"	24.2	23.6	20.1	9.4	36.1	35.4	29.6	15.2
	10" up	7.8	7.6	6.5	3.0	4.7	4.6	3.8	.....
Red oak.....	4"-9"	.....	.....	.....	.....	29.5	29.0	24.1	27.7
	10" up	.....	.....	.....	.....	27.2	26.6	22.2	20.9



TABLE 20 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1 cu. ft.	2 cu. ft.	3 cu. ft.	4 cu. ft.	1 cu. ft.	2 cu. ft.	3 cu. ft.	4 cu. ft.
White birch.....	4"-9" 10" up	.....	.....	.....	.....	55.2 19.6	54.2 19.2	45.1 16.0	64.1 14.8
Poplar (all).....	4"-9" 10" up	.....	.....	.....	.....	131.5 61.3	128.9 60.1	107.4 50.1	254.5 73.4
Red maple.....	4"-9" 10" up	12.9 37.0	12.6 36.0	10.7 30.6	5.0 14.3	60.2 41.9	59.1 41.0	49.2 34.2	23.5 21.3
Black ash.....	4"-9" 10" up	10.7 14.2	10.4 13.9	8.9 11.7	4.1 5.5	26.3 16.8	25.8 16.5	21.5 13.7	16.1 14.2
Basswood.....	4"-9" 10" up	5.6 76.3	5.4 74.4	4.6 63.2	2.1 29.5	17.3 41.7	16.9 40.9	14.1 34.1	.....
Black cherry.....	4"-9" 10" up	10.7 14.2	10.5 13.8	8.9 11.7	4.1 5.5	20.7 6.5	20.3 6.4	16.9 5.3	4.6 .....
TOTAL HARDWOODS.....	4"-9" 10" up	499.2 2847.2	486.6 2775.2	413.6 2358.5	192.8 1099.7	914.5 1226.5	896.9 1202.6	747.3 1001.9	474.0 219.0
GRAND TOTAL.....	4"-9" 10" up	553.7 3006.3	539.7 2930.3	458.7 2490.3	213.8 1161.2	958.2 1309.8	939.7 1284.3	783.1 1069.9	492.8 266.2
TOTAL 4" UP.....		3560.0	3470.0	2949.0	1375.0	2268.0	2224.0	1853.0	759.0
MIXEDWOOD MATURE (M-I)					MIXEDWOOD IMMATURE (M-II)				
White pine.....	4"-9" 10" up	4.0 24.2	3.8 22.8	2.8 17.0	1.1 6.8	115.9 253.1	97.9 213.9	64.9 141.7	33.3 164.7
Red pine.....	4"-9" 10" up	.....	.....	.....	.....	5.8 3.2	4.9 2.7	3.2 1.8	..... 18.5
Jack pine.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	46.7
White spruce.....	4"-9" 10" up	12.3 88.5	11.6 83.4	8.6 62.1	3.4 24.8	34.2 55.8	28.9 47.1	19.2 31.2	1.2
Black spruce.....	4"-9" 10" up	1.8 22.4	1.7 21.1	1.3 15.7	0.5 6.3	.....	.....	.....	.....
Balsam fir.....	4"-9" 10" up	79.2 13.5	74.6 12.8	55.6 9.5	22.2 3.8	182.7 33.3	154.4 28.1	102.4 18.6	1.2
Hemlock.....	4"-9" 10" up	158.9 1017.9	149.8 959.8	111.6 714.8	44.6 285.4	153.7 266.3	129.9 225.0	86.1 149.1	8.6 28.9
White cedar.....	4"-9" 10" up	23.5 65.2	22.2 61.4	16.5 45.8	6.6 18.3	36.8 29.2	31.1 24.7	20.6 16.4	.....
TOTAL CONIFERS.....	4"-9" 10" up	279.7 1231.7	263.7 1161.3	196.4 864.9	78.4 345.4	529.1 640.9	447.1 541.5	296.4 358.8	91.0 212.1
Hard maple.....	4"-9" 10" up	169.1 874.7	159.4 824.8	118.7 614.3	47.4 245.3	124.8 259.2	105.5 219.0	69.9 145.1	11.6 70.8
Yellow birch.....	4"-9" 10" up	69.8 1155.3	65.8 1089.4	49.0 811.3	19.6 323.9	89.5 330.5	75.6 279.3	50.1 185.1	7.4
Beech.....	4"-9" 10" up	13.3 43.1	12.5 40.7	9.3 30.3	3.7 12.1	15.0 33.0	12.7 27.9	8.4 18.5	.....
Elm.....	4"-9" 10" up	6.5 29.8	6.1 28.1	4.5 21.0	1.8 8.4	8.2 24.8	7.0 20.9	4.6 13.9	.....
Hornbeam.....	4"-9" 10" up	11.1 4.9	10.5 4.7	7.8 3.5	3.1 1.4	16.3 1.7	13.8 1.4	9.2 0.9	.....
Oak.....	4"-9" 10" up	.....	.....	.....	.....	25.5 34.5	21.5 29.2	14.3 19.3	4.5 6.0
White birch.....	4"-9" 10" up	.....	.....	.....	.....	110.1 60.9	93.1 51.4	61.7 34.1	25.4 5.4
Poplar.....	4"-9" 10" up	.....	.....	.....	.....	149.3 198.7	126.2 167.9	83.6 111.3	121.5 52.6
Red maple.....	4"-9" 10" up	36.9 47.7	34.8 45.0	25.9 33.5	10.3 13.4	116.5 102.5	98.4 86.6	65.2 57.4	5.5
Ash.....	4"-9" 10" up	21.2 35.2	20.0 33.2	14.9 24.7	5.9 9.9	59.6 48.4	50.4 40.9	33.4 27.1	.....
Black cherry.....	4"-9" 10" up	.....	.....	.....	.....	15.8 5.2	13.3 4.4	8.8 2.9	1.2
TOTAL HARDWOODS.....	4"-9" 10" up	327.9 2190.7	309.1 2065.9	230.1 1538.6	91.8 614.4	730.6 1099.4	617.5 928.9	409.2 615.6	169.7 142.2
GRAND TOTAL.....	4"-9" 10" up	607.6 3422.4	572.8 3227.2	426.5 2403.5	170.2 959.8	1259.7 1740.3	1064.6 1470.4	705.6 974.4	260.7 354.3
TOTAL 4" UP.....		4030.0	3800.0	2830.0	1130.0	3000.0	2535.0	1680.0	615.0

## *Notes*

---

## *Notes*

---







**Hon. Welland S. Gemmell**

*Minister*

**F. A. MacDougall**

*Deputy Minister*

*W.B. Morrison*

Report No. 9 of the  
**WHITE RIVER DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

—1953—

Division of Timber Management  
Ontario Department of Lands and Forests





# *Forest Resources Inventory*

— 1953 —

Report No. 9 of the  
**WHITE RIVER DISTRICT**



Division of Timber Management  
Ontario Department of Lands and Forests

# PREFACE

● One of the important undertakings of the Department of Lands and Forests, in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to Ontario one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources of the Province, the Department of Lands and Forests has set up twenty-two districts, which constitute the field administrative units of the Department. The forest resources inventory covers sixteen of these districts and parts of two additional districts. The inventory covers the accessible forest area of Ontario, totalling 172,000 square miles. This report deals with the results of the inventory in the White River district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and to community welfare, and to the industrial and commercial development of the province as a whole. This objective is being given material effect through the use of the inventory data in the preparation of long term timber management plans.





# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	19
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	22
AREAS.....	9	APPENDIX.....	23
FOREST LAND OWNERSHIP.....	9	SURVEY METHODS.....	23
AGE CLASSES.....	10	MEAN ANNUAL INCREMENT.....	23
REGIONAL FOREST TYPES.....	10	AGE CLASSES.....	23
COVER TYPES.....	11	ROTATION.....	23
VOLUME.....	13	ALLOWABLE CUT.....	24
CONIFERS VS. HARDWOODS.....	14	CULL FACTOR.....	25
SAWLOGS VS. PULPWOOD.....	14	VOLUME CONVERSION.....	25

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES.....	9	FIG. 10 — VOLUME OF PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND BY AGE AND SIZE CLASSES.....	16
FIG. 2 — WHITE RIVER DISTRICT, 1952.....	10	FIG. 11 — VOLUME OF IMMATURE TIMBER BY SIZE CLASSES ON PATENTED LAND IN THE WHITE RIVER DISTRICT.....	16
FIG. 3 — ECOLOGICAL DIVISIONS.....	11	FIG. 12 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON CROWN LAND IN THE WHITE RIVER DISTRICT.....	20
FIG. 4 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	11	FIG. 13 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK BY SPECIES ON PATENTED LAND.	20
FIG. 5 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY COVER TYPES AND AGE CLASSES.	13	FIG. 14 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LAND IN THE WHITE RIVER DISTRICT.....	22
FIG. 6 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SPECIES AND AGE CLASSES.....	13	FIG. 15 — AREA COMPANY INVENTORY USED.....	23
FIG. 7 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SIZE CLASSES.....	14		
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LAND BY SIZE CLASSES.....	15		
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND BY AGE AND SIZE CLASSES IN THE WHITE RIVER DISTRICT.....	15		



# SURVEY HIGHLIGHTS

1. The White River district is located in the Boreal forest zone, with relative level topography in the north, rolling towards east, rough and irregular in the southwest. Black spruce, white birch, poplar and jack pine are the main species in the district; white spruce and balsam fir appear in moderate quantities, and larch, yellow birch and red maple are scarcely represented. Most of the district is of mixedwoods type, 27 per cent is coniferous type and only 11 per cent pure hardwood.

2. The total area of the White River district is 4,375,396 acres, or 6,837 square miles. Productive forest lands are 3,866,391 acres in area, or 88 per cent of the district. Water covers 8 per cent, non-productive area amounts to 4 per cent and non-forested lands appear on less than one per cent.

3. Of the total area of the White River district, 89 per cent is Crown land, 10 per cent is patented land comprising Algoma Central Railway lands, and one per cent is patented land in small holdings. For the purpose of this report, Algoma Central Railway patented lands are treated as Crown lands.

4. The age class distribution for the productive forest lands shows 46 per cent of the area mature, 39 per cent immature and 15 per cent young growth and reproducing forest.

5. The volume of the primary growing stock is nearly 6 billion cubic feet, 1,526 cubic feet per acre productive forest area. Of the total volume, 56 per cent is made up of conifers and 44 per cent of hard-

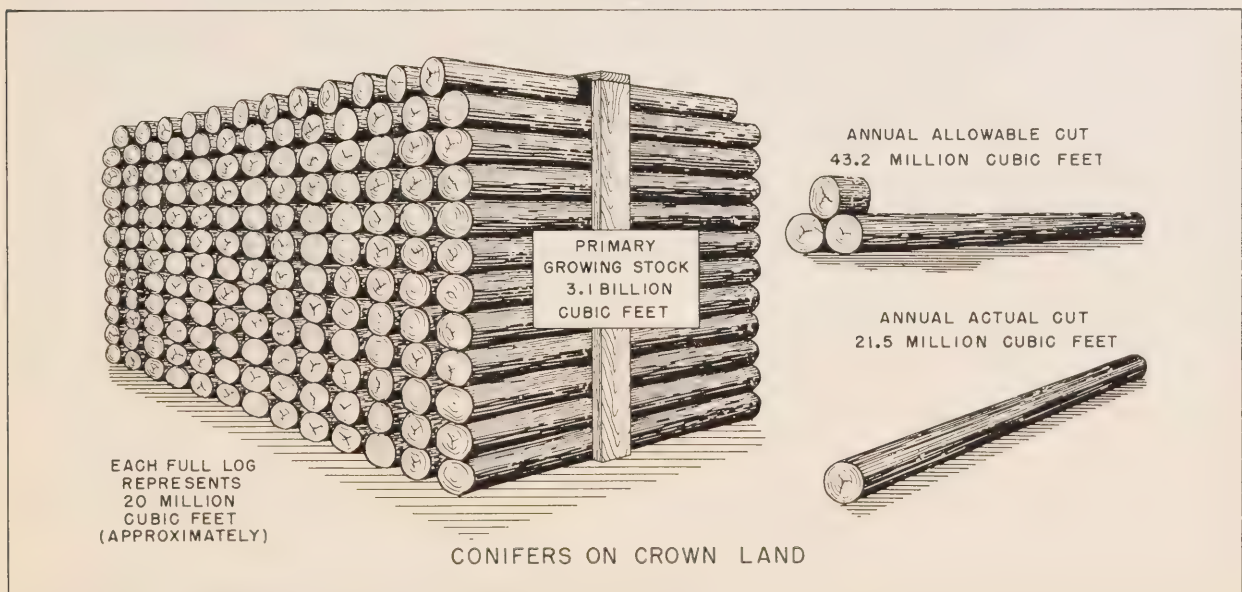
woods. Black spruce makes up 25 per cent of the total volume on productive forest land, white birch 24 per cent, poplar 20 per cent, jack pine 13 per cent, white spruce 9 per cent and other species 9 per cent.

6. In the mature age class on Crown lands 2.1 billion cubic feet are in the 4-9 inch size class and 1.6 billion cubic feet in the 10 inch and over size class. Black spruce has 80 per cent of its mature volume in the pulpwood size class, jack pine is almost evenly divided between pulpwood and sawlog classes, hardwoods show a slight preponderance of sawlog material.

7. The annual allowable cut for the district is more than 101 million cubic feet, 97 per cent of which is on Crown lands and only 3 per cent on patented lands.

8. Of the allowable cut on Crown lands of 99 million cubic feet, 45 per cent is coniferous species and 55 per cent hardwood species. The allowable cut of conifers is made up of 53 per cent spruce, 32 per cent jack pine, 13 per cent balsam fir and two per cent other conifers. The hardwood allowable cut is made up of 57 per cent poplar and 43 per cent white birch.

9. A comparison of the allowable cut on Crown lands with the current actual utilization shows that only conifers were utilized. Spruce and balsam fir were well utilized, jack pine shows a large surplus of allowable cut over present utilization.







MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50



*Forest resources inventory photograph of White River Railway Station taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area of the White River district for the purposes of this report is 4,375,396 acres (table 1), 6,837 square miles, excluding Indian Reserve lands. It is important to note that this area extends only to the shore of Lake Superior and excludes Michipicoten and all other islands. The boundary between the White River and Geraldton districts was taken as the height of land separating the Ontario Paper Concession and the Pic Concession of the Marathon Paper Co. This deviates slightly from the boundary of the White River district as laid down on current administrative maps of the Department.

The White River district is essentially a timber-producing area with 3,866,391 acres or 88 per cent of the total area classified as productive forest lands (fig. 1). Non-forested lands, including lands permanently withdrawn from timber production, comprise only 10,674 acres or less than one per cent of

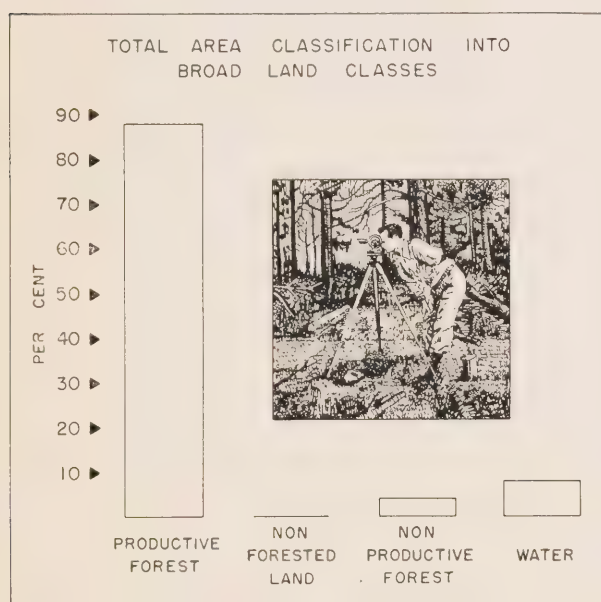


FIGURE 1

the total area. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity occupy 164,966 acres or under 4 per cent of the total area.

The non-forested lands are mainly composed of unclassified land. There is no developed agricultural land or grass and meadow land in the White River

district. Water covers 333,365 acres or 8 per cent of the total area.

## Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort, and for other uses. All of these various types of ownership are grouped under "Patented lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in

TABLE 1. — Total area classification into broad land and ownership groupings.

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	3,820,505	45,886	3,866,391
Non-forested land <sup>2</sup>			
Developed agricultural land.....			
Grass and meadow land.....			
Non-reproducing burn.....	222		222
Unclassified land <sup>3</sup> .....	10,346	106	10,452
TOTAL.....	10,568	106	10,674
Non-productive forest <sup>4</sup>			
Open muskeg.....	97,100	1,162	98,262
Treed muskeg.....	39,492	1,112	40,604
Brush, alder, and flooded land....	13,815	992	14,807
Rock outcrop.....	8,360		8,360
Barrens.....	2,933		2,933
TOTAL.....	161,700	3,266	164,966
Water.....	333,365		333,365
TOTAL AREA.....	4,326,138	49,258	4,375,396

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be out of the commercial timber producing class, owing to very low productivity.

Ontario to reserve all pine timber to the Crown at time patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands, therefore, presents a complicated picture. In the course of the inventory no attempt has been made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

In the White River district, land ownership is further complicated by eighteen townships, approximately 455,430 acres, of Algoma Central Railway lands. This area is actually patented land, but for purposes of this report is included in the Crown land area of the district. The area is managed as a forest property and was not separated from the Crown areas in the company report to the Department of Lands and Forests. For the purposes of all volume calculations and the assessment of the allowable cut these lands are treated as Crown lands in this report.

Of the total area of the White River district of 4,375,396 acres, 4,326,138 acres or 99 per cent is in the ownership of the Crown and only 49,258 acres or one per cent is patented land (fig. 2). Considering only the productive forest lands, the relationship remains the same. Thus, for all practical purposes, the patented land within the district may be disregarded.

#### Age Classes

For sustained timber yields, a forest should be made up of all age classes and stages of development

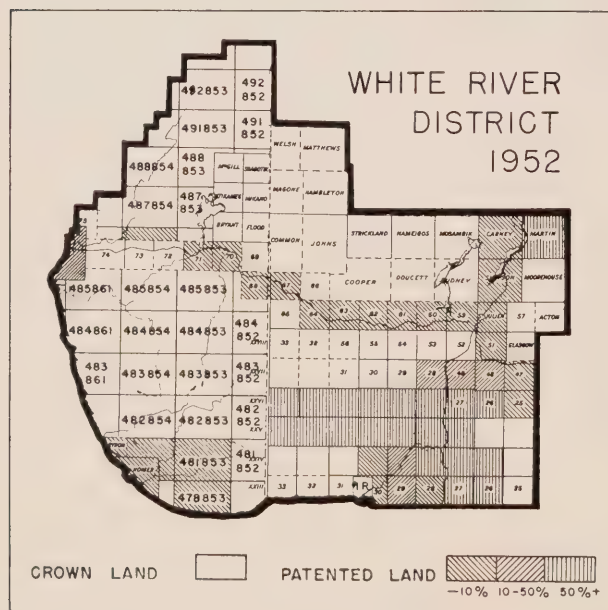


FIGURE 2

from seedlings to mature timber in such proportions that when one group of trees is harvested, another is ready to take its place. The present forests of the White River district do not meet this requirement.

For the district as a whole, 1,793,191 acres or 46 per cent (table 2), of the productive forest is in the mature age class. The immature age class comprises 1,488,423 acres or 39 per cent. The remaining 15 per cent is made up of young growth with 345,241

TABLE 2. — Classification of productive forest land into types and age classes.

Age class and cover type	Crown land	Patented land	Total	Productive forest
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	579,095	4,310	583,405	15
Hardwood.....	129,365	1,727	131,092	3
Mixedwoods.....	1,072,082	6,612	1,078,694	28
TOTAL.....	1,780,542	12,649	1,793,191	46
Immature forest:				
Coniferous.....	367,194	7,741	374,935	10
Hardwood.....	216,670	5,394	222,064	6
Mixedwoods.....	882,928	8,496	891,424	23
TOTAL.....	1,466,792	21,631	1,488,423	39
Young growth:				
Coniferous.....	103,428	246	103,674	3
Hardwood.....	51,995	5,394	57,389	1
Mixedwoods.....	182,498	1,680	184,178	5
TOTAL.....	337,921	7,320	345,241	9
Reproducing forest.....	235,250	4,286	239,536	6
TOTAL PRODUCTIVE FOREST.....	3,820,505	45,886	3,866,391	100

acres, and reproducing forest occupying 239,536 acres.

The age class distribution for Crown lands is almost identical with the total productive forest with: 47 per cent mature, 38 per cent immature, 9 per cent young growth, and 6 per cent reproducing forest.

On the small area of patented land in the district the age class distribution is changed considerably with: 28 per cent mature, 47 per cent immature, 16 per cent young growth and 9 per cent reproducing forest.

#### Regional Forest Types

The regional distribution of forest types in Ontario is influenced by the lowering in temperature from south to north and a reduction in rainfall and general

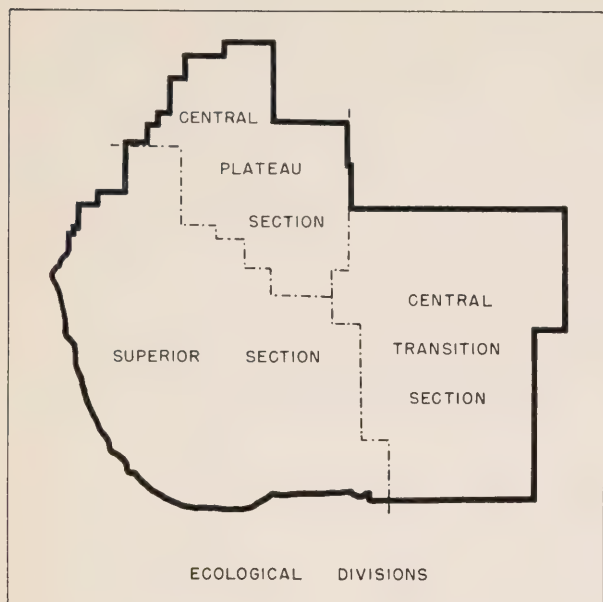


FIGURE 3

atmospheric humidity from east to west. The regularity of the response of forest growth to these two variable factors is modified by the proximity of large bodies of water, especially the "Great Lakes" system; topography, the distribution of broad soil types and other local conditions. These factors are expressed in the limits of distribution of certain commercial tree species and in the volume and growth rate of the forest. Separate volume tables and yield tables are made for each region or section, and they serve as units in the compilation of volume estimates.

In the White River district, three forest regions or sections have been recognized (fig. 3), as follows:

1. The Central Plateau section in the north, covering 20 per cent of the total area.
2. The Central Transition section in the east, covering 36 per cent of the total area.
3. The Superior section in the southwest, covering 44 per cent of the total area.

All three sections belong to the Boreal forest zone.

The Central Plateau section, lying along the height of land north of Lake Superior, is a relatively level area characterized by extensive sand and gravel deposits, by low outcrops and by shallow swampy depressions. Jack pine associations are prevalent on the coarse gravel and sandy soils. Black spruce occurs as well developed stands in shallow swamps and reaches maximum development on the better-drained level country. Mixtures of these two species

are common with white birch and poplar as members of the association.

The Central Transition section is basically of the Boreal forest zone, but contains certain species of the Great Lakes St. Lawrence forest region either as scattered individuals or in more or less isolated patches. The topography is rolling with numerous lakes. The general character of the forest is a mixed one. Spruce-fir stands occupy all of the heavier well-drained soils as a mature forest. Jack pine stands, dense and of good development, are found on coarse sand and gravelly soils. White birch and poplar are the only important hardwood species.

The Superior section, covering 44 per cent of the district, has its eastern boundary within the district. This section has a rough, irregular topography with hills rising steeply from the lakes and wide river valleys extending northward. Deposits from glacial Lake Algonquin are common in these valleys. Most of the section is covered by a thin glacial till but much exposed rock is present. A characteristic feature of the section is the presence of white spruce associations with some balsam fir, poplar, and white birch. The higher and more rocky elevations support jack pine and white birch, while the lower and poorly drained positions support black spruce, larch and scattered white cedar.

#### Cover Types

The forests of the White River district contain eleven native species. Three of these, larch, yellow

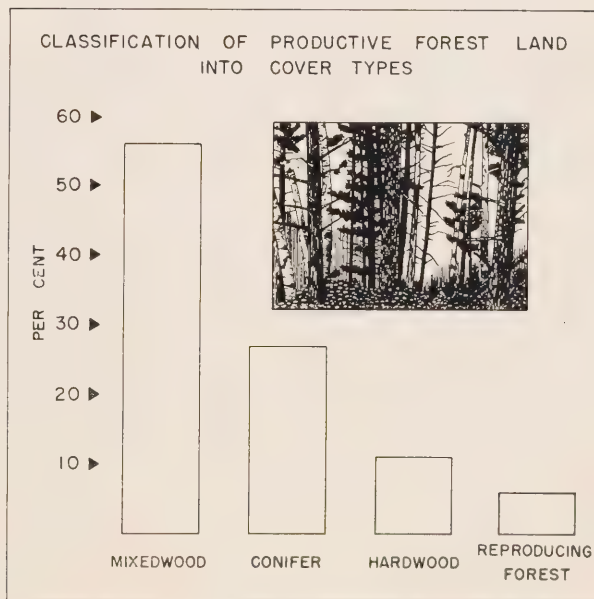


FIGURE 4



birch, and red maple, appear in such small quantities that they may be disregarded. Of the remaining species, six make up 98 per cent of the total volume: black spruce 25 per cent, white spruce 9 per cent, jack pine 13 per cent, balsam fir 7 per cent, white birch 24 per cent and poplar 20 per cent.

Three broad cover types, coniferous, hardwood and mixedwoods, are recognized. The coniferous type is composed of 75 per cent or more of conifers or softwoods, the hardwood type contains 75 per cent or more hardwood or broadleaved trees. All other combinations are recognized as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts, areas of reproducing forests, too recently established to have attained a sufficiently stable composition to be classified into types on the basis of composition. These areas are referred to as reproducing forest.

For the district as a whole the mixedwoods type predominates, occupying 56 per cent of the productive forest area (table 3). The coniferous type occupies 27 per cent and the hardwood type 11 per cent. Six per cent is classed as reproducing forest (fig. 4).

The distribution of cover types for Crown lands is very similar to the productive forest area with a decrease of one per cent in the hardwood type and a similar increase in the coniferous type. Patented lands, which occupy only one per cent of the total area show: 27 per cent coniferous, 27 per cent hardwood, 37 per cent mixedwood, and 9 per cent reproducing forest.

TABLE 3. — *Classification of productive forest lands into cover types.*

Age class and cover type	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	579,095	15	4,310	9	583,405	15
Immature.....	367,194	10	7,741	17	374,935	10
Young growth.	103,428	3	246	1	103,674	2
TOTAL.....	1,049,717	28	12,297	27	1,062,014	27
Hardwood type:						
Mature.....	129,365	3	1,727	3	131,092	3
Immature.....	216,670	6	5,394	12	222,064	6
Young growth.	51,995	1	5,394	12	57,389	2
TOTAL.....	398,030	10	12,515	27	410,545	11
Mixedwoods type:						
Mature.....	1,072,082	28	6,612	14	1,078,694	28
Immature.....	882,928	23	8,496	19	891,424	23
Young growth.	182,498	5	1,680	4	184,178	5
TOTAL.....	2,137,508	56	16,788	37	2,154,296	56
Reproducing forest.....	235,250	6	4,286	9	239,536	6
TOTAL PRODUCTIVE FOREST.....	3,820,505	100	45,886	100	3,866,391	100



*Filling water tank for icing haul roads*

## Volume

The volume of the primary growing stock includes all living trees 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the White River district is nearly 6 billion cubic feet (5,898,969,000 cubic feet). This is an average of 1,526 cubic feet per acre (table 4). The mature age class contains 3.7

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average total cu. ft.
	4"-9" d.b.h.	10"+ d.b.h.	Average	4"-9" d.b.h.	10"+ d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1185	881	2066	1098	1060	2158	2067
Immature.....	985	484	1469	1398	339	1737	1473
Productive forest.....	931	596	1527	962	452	1414	1526

billion cubic feet or 63 per cent of the total volume (table 5). This is an average of 2,067 cubic feet per acre. The immature age class contains 2.2 billion cubic feet or 1,473 cubic feet per acre.

The volume of the primary growing stock on Crown lands is 5.8 billion cubic feet (table 6), or an average of 1,527 cubic feet per acre. This represents 99 per cent of the total growing stock in the district and is

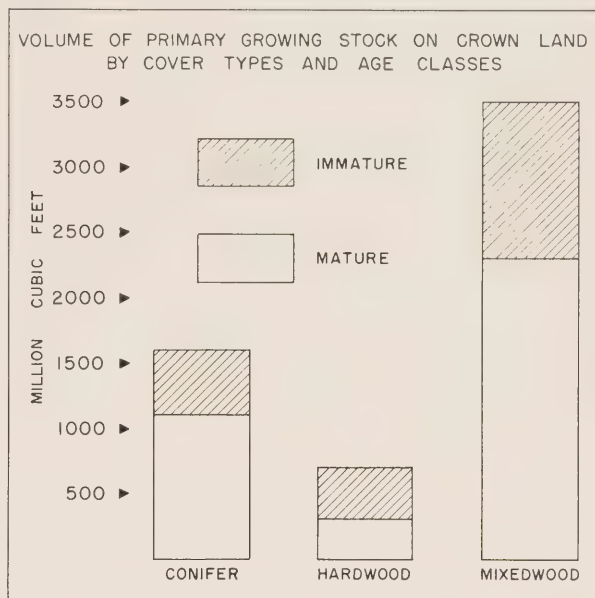


FIGURE 5

divided between the three cover types as shown in figure 5. The mature age class contains 3.7 billion cubic feet and the immature age class 2.1 billion cubic feet.

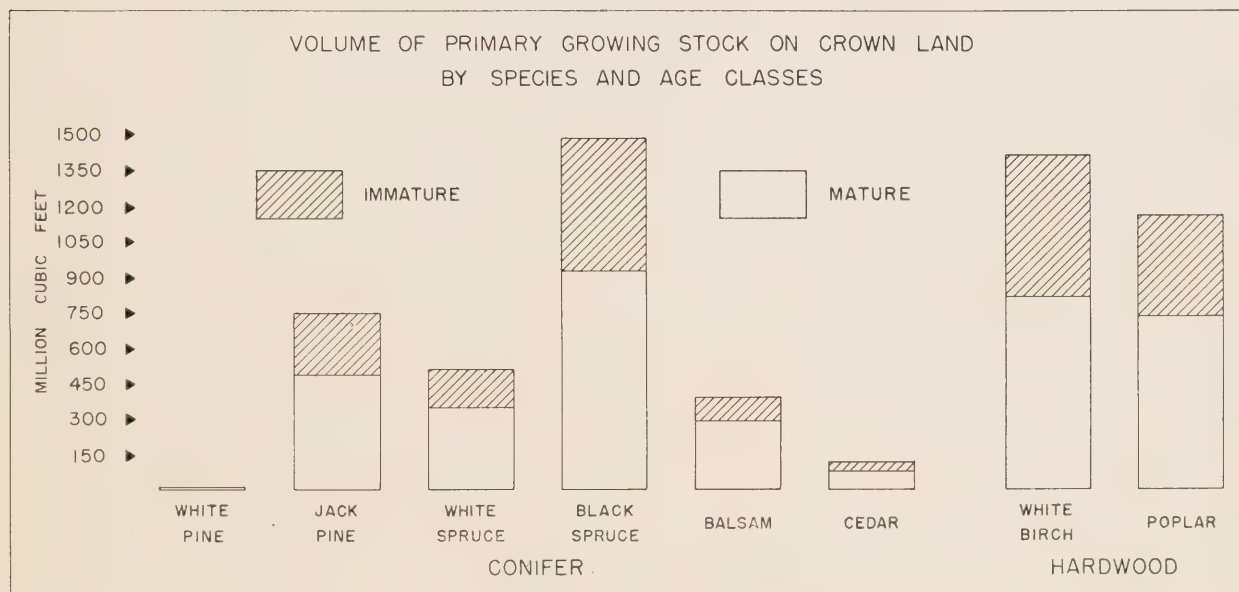


FIGURE 6



Patented lands contain only one per cent of the total volume of the White River district. This amounts to almost 65 million cubic feet (table 7), averaging 1,414 cubic feet per acre. The mature age class contains 27 million cubic feet or 2,158 cubic feet per acre and the immature age class has 38 million cubic feet or 1,737 cubic feet per acre.

### *Conifers vs. Hardwoods*

Crown land contains 99 per cent of the primary growing stock of the district (table 9). The coniferous species on Crown lands make up 56 per cent of the primary growing stock in the White River district. The balance of 44 per cent is hardwood species, almost entirely white birch and poplar. The total coniferous volume is 3.2 billion cubic feet and the hardwood volume is 2.6 billion cubic feet. In the mature age class conifers comprise 58 per cent of the total volume, while in the immature age class this is reduced to 52 per cent of the total volume.

The most important conifer is black spruce which makes up 46 per cent of the total cubic volume of conifers on Crown lands (fig. 6). It is followed by jack pine with 23 per cent, white spruce 16 per cent, and balsam fir, 12 per cent.

The hardwood volume is comprised mainly of white birch, 55 per cent and poplar 45 per cent. There is slightly over 100,000 cubic feet of yellow birch and red maple.

### *Sawlogs vs. Pulpwood*

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4–9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4–9 inches d.b.h. are considered as pulpwood and cordwood material depending on species, although poles, railway ties, and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for sawlogs and other uses where large timber is required. A tree 10 inches d.b.h. outside bark will on the average give one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition there is residual smaller size material in the top which may be used as pulpwood or for purposes other than saw timber. The quantity in this residual top is relatively small and is included in the 10 inches and over material in all inventory estimates. With the increase in use of present forest and mill waste, the future may see a much larger proportion of the primary growing stock come into economic use.

Since the volume on Crown land is so close to that on the productive forest land as a whole, a discussion of the latter will be omitted and only the volumes on Crown lands and on patented lands will be considered.

Of the volume of the primary growing stock on Crown lands 3,556 million cubic feet are in the 4–9 inch d.b.h. size class and 2,278 million cubic feet in the 10 inch d.b.h. class and over (table 9). Sixty-one per cent of the total volume is in the pulpwood size class and 39 per cent is of sawlog size. Considering only the mature age class 2,111 million cubic feet are in the 4–9 inch size class and 1,568 million cubic feet are in the 10 inch and over size class (fig. 7). The immature volume of 2,155 million cubic feet has 67 per cent in the pulpwood size class and 33 per cent in the sawlog size class.

The patented lands contain only 64,873,000 cubic feet. Of this volume, 68 per cent is in the 4–9 inch d.b.h. group and 32 per cent in the 10 inch and over d.b.h. group. The mature age class is almost evenly divided between these two groups with 13.9 million cubic feet in the lower diameter class and 13.4 million cubic feet in the larger class (fig. 8). The immature age class has 30 million cubic feet in the pulpwood size class and only 7 million cubic feet in the sawlog size class.

On Crown land three of the coniferous species,

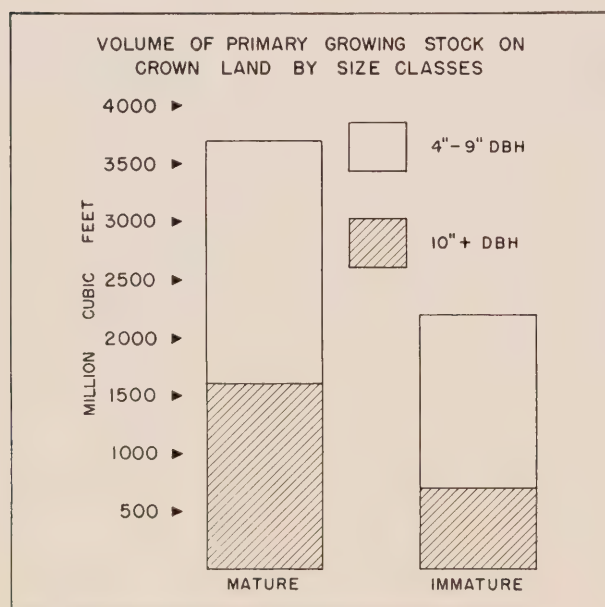


FIGURE 7



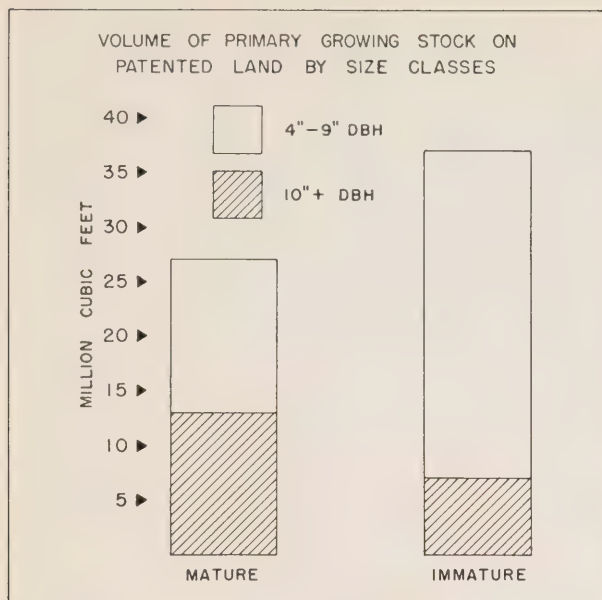


FIGURE 8

white pine, white spruce, and white cedar, have the greater portion of their volume in the sawlog size class (table 9, fig. 9), in both the mature and immature age classes. Black spruce, which is the principal species in both age classes, has 80 per cent of its mature and 84 per cent of its immature volume in the pulpwood size class. In the mature age class jack pine is almost evenly divided between the two size classes. Jack pine in the immature, and balsam



*Ingenious tractor types are designed to haul long log trains to shipping points*

fir in both age classes, is composed mainly of pulpwood material.

The size class relationships of the volume of the

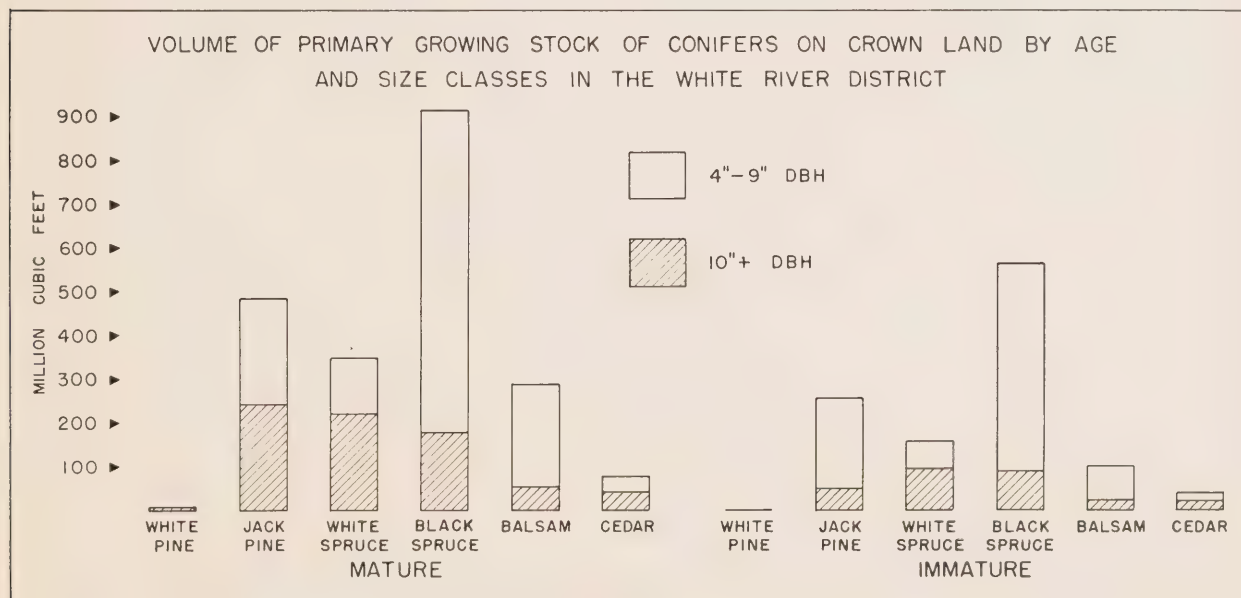


FIGURE 9

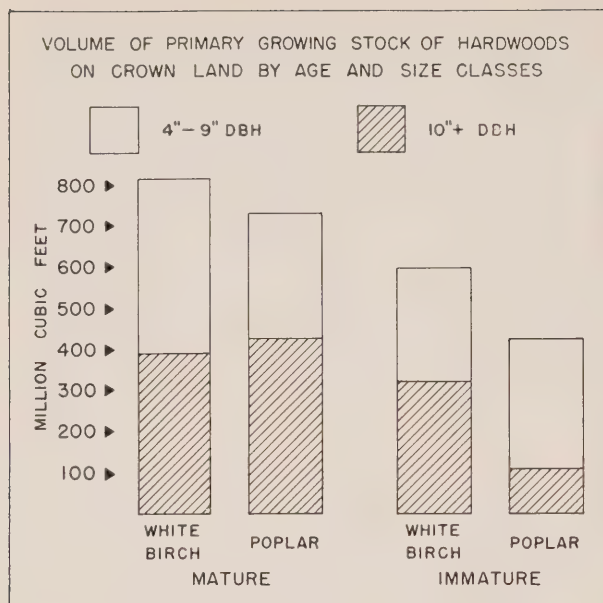
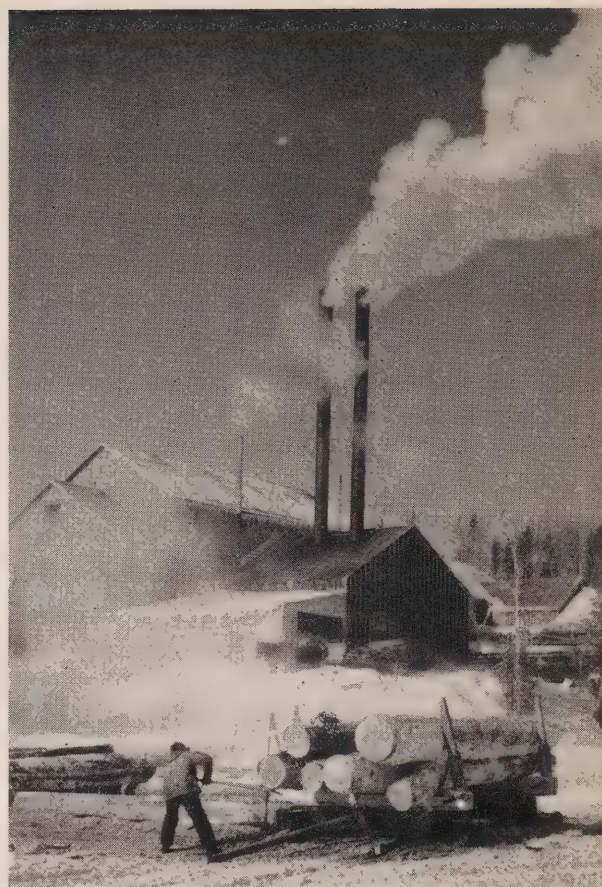


FIGURE 10

primary growing stock of hardwood species on Crown land is shown in figure 10. The mature age class contains a slight preponderance of sawlog material, the immature of cordwood material.

For patented lands the mature age class has a slightly larger proportion of sawlog material (table 10). The immature age class is mainly made up of the smaller diameter group as shown in figure 11.



*Sawmilling operations*

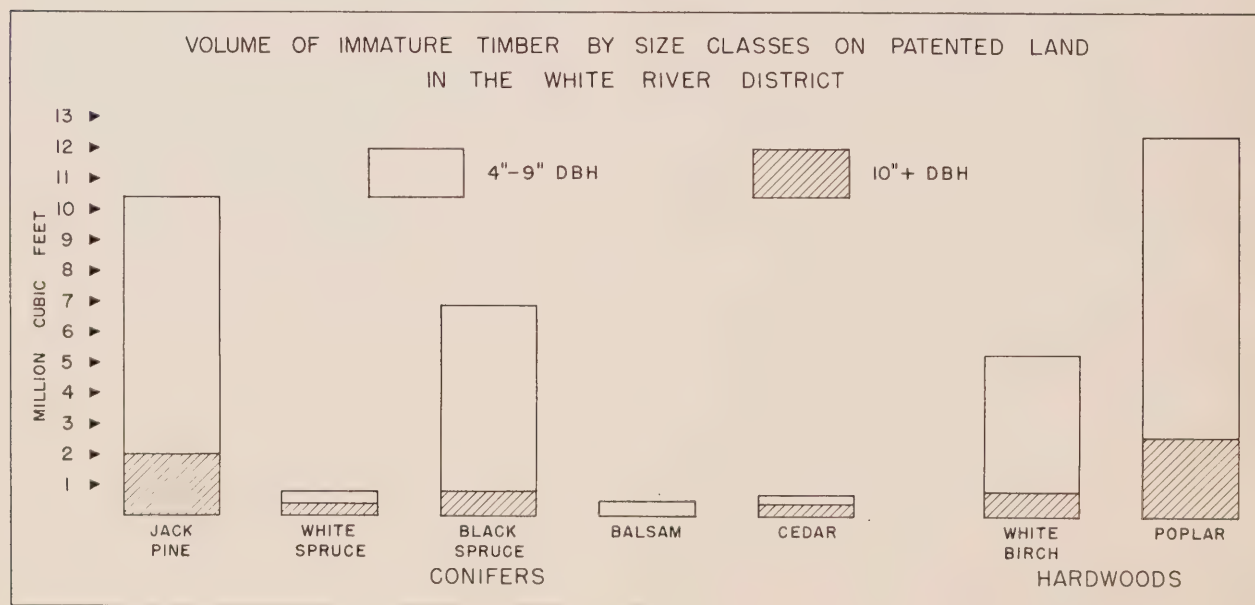


FIGURE 11

TABLE 5. — Cubic foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the White River district by species groups, age classes and cover type in two size classes.

ALL SPECIES

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	808,951	330,666	434,385	86,674	1,660,676
Hardwood.....	167,945	143,656	229,863	197,757	739,221
Mixedwoods.....	1,147,795	1,107,035	811,418	432,824	3,499,072
TOTAL....	2,124,691	1,581,357	1,475,666	717,255	5,898,969

ALL CONIFERS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	744,724	284,552	404,041	70,784	1,504,101
Hardwood.....	29,793	15,766	46,353	19,492	111,404
Mixedwoods.....	614,268	455,072	415,466	193,406	1,678,212
TOTAL....	1,388,785	755,390	865,860	283,682	3,293,717

ALL HARDWOODS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	64,227	46,116	30,344	15,889	156,576
Hardwood.....	138,151	127,888	183,510	178,266	627,815
Mixedwoods.....	533,528	651,963	395,952	239,418	1,820,861
TOTAL....	735,906	825,967	609,806	433,573	2,605,252

TABLE 6. — Cubic foot volumes of primary growing stock on Crown lands in the White River district by species groups, age classes and cover type in two size classes.

ALL SPECIES

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	803,195	327,104	423,643	84,590	1,638,532
Hardwood.....	165,896	141,700	222,786	196,175	726,557
Mixedwoods....	1,141,709	1,099,145	799,000	429,153	3,469,007
TOTAL....	2,110,800	1,567,949	1,445,429	709,918	5,834,096

ALL CONIFERS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	739,435	281,398	394,223	68,957	1,484,013
Hardwood.....	29,563	15,496	45,705	19,040	109,804
Mixedwoods.....	611,388	451,814	409,986	191,817	1,665,005
TOTAL....	1,380,386	748,708	849,914	279,814	3,258,822

ALL HARDWOODS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	63,760	45,707	29,421	15,632	154,520
Hardwood.....	136,333	126,203	177,080	177,136	616,752
Mixedwoods.....	530,321	647,331	389,014	237,336	1,804,002
TOTAL....	730,414	819,241	595,515	430,104	2,575,274



TABLE 7. — Cubic foot volumes of primary growing stock on patented lands in the White River district by species groups, age classes and cover type in two size classes.

ALL SPECIES

Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	5,756	3,562	10,742	2,084	22,144
Hardwood.....	2,049	1,956	7,077	1,582	12,664
Mixedwoods.....	6,086	7,890	12,418	3,671	30,065
TOTAL...	13,891	13,408	30,237	7,337	64,873

ALL CONIFERS

Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	5,289	3,154	9,818	1,827	20,088
Hardwood.....	230	270	648	452	1,600
Mixedwoods.....	2,880	3,258	5,480	1,589	13,207
TOTAL...	8,399	6,682	15,946	3,868	34,895

ALL HARDWOODS

Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	467	409	923	257	2,056
Hardwood.....	1,818	1,685	6,430	1,130	11,063
Mixedwoods.....	3,207	4,632	6,938	2,082	16,859
TOTAL...	5,492	6,726	14,291	3,469	29,978

TABLE 8. — Cubic foot volumes of primary growing stock on productive forest lands in the White River district by species and age classes in two size classes.

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....		7,966	66	1,914	9,946
Jack pine.....	246,050	246,048	218,886	50,631	761,615
White spruce....	129,334	221,966	64,536	96,131	511,967
Black spruce....	743,118	180,355	481,432	90,343	1,495,248
Balsam fir.....	235,461	54,169	80,268	22,714	392,612
White cedar.....	34,244	44,858	18,213	21,865	119,180
Larch.....	578	28	2,459	84	3,149
TOTAL CONIFERS.....	1,388,785	755,390	865,850	283,682	3,293,717
Yellow birch....			14	132	146
White birch.....	429,555	393,641	281,466	321,355	1,426,017
Poplar (all).....	306,351	432,326	328,307	112,086	1,179,070
Red maple.....			19		19
TOTAL HARDWOODS.....	735,906	825,967	609,806	433,573	2,605,252
TOTAL ALL SPECIES	2,124,691	1,581,357	1,475,666	717,255	5,898,969

TABLE 9. — Cubic foot volumes of primary growing stock on Crown lands in the White River district by species and age classes in two size classes.

Species	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....		7,966	60	1,734	9,760
Jack pine.....	242,583	242,754	210,502	48,620	744,459
White spruce....	128,777	220,650	64,124	95,726	509,277
Black spruce....	739,791	179,128	475,325	89,533	1,483,777
Balsam fir.....	234,865	54,079	79,819	22,683	391,446
White cedar.....	33,845	44,106	17,923	21,446	117,320
Larch.....	525	25	2,161	72	2,783
TOTAL CONIFERS.....	1,380,386	748,708	849,914	279,814	3,258,822
Yellow birch....			10	99	109
White birch.....	426,865	391,363	276,961	320,542	1,415,731
Poplar (all).....	303,549	427,878	318,530	109,463	1,159,420
Red maple.....			14		14
TOTAL HARDWOODS.....	730,414	819,241	595,515	430,104	2,575,274
TOTAL ALL SPECIES	2,110,800	1,567,949	1,445,429	709,918	5,834,096

TABLE 10. — *Cubic foot volumes of primary growing stock on patented lands in the White River district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....			6	180	186
Jack pine.....	3,467	3,294	8,384	2,011	17,156
White spruce.....	557	1,316	412	405	2,690
Black spruce.....	3,327	1,227	6,107	810	11,471
Balsam fir.....	596	90	449	31	1,166
White cedar.....	399	752	290	419	1,860
Larch.....	53	3	298	12	366
TOTAL CONIFERS.....	8,399	6,682	15,946	3,868	34,895
Yellow birch.....			4	33	37
White birch.....	2,690	2,278	4,505	813	10,286
Poplar (all)....	2,802	4,448	9,777	2,623	19,650
Red maple.....			5		5
TOTAL HARDWOODS.....	5,492	6,726	14,291	3,469	29,978
TOTAL ALL SPECIES	13,891	13,408	30,237	7,337	64,873

### Allowable Cut

The allowable cut has been computed for each species with the aid of a volumetric formula<sup>1</sup> and appropriate rotation<sup>2</sup> for species. Thus the amount of the allowable cut results from the volume of the primary growing stock and rotation adopted for each species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may appear on areas which, at the moment, are inaccessible to operations or which are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential, rather than actually available under present operating conditions.

The calculation of allowable cut, based on the present volume of the primary growing stock, is of value for a period of about ten years. This is because of wood operations being carried out, and the present stands growing in volume, each year. Therefore, the size and structure of the primary growing stock, regarded as the foundation of the allowable cut

calculations, change also from year to year and for that reason, on expiration of the initial ten year period the allowable cut should be calculated anew. With effective forestry practices allowable cuts for the valuable species will increase; without them the present trend to more poplar and white birch may continue.

A portion of patented lands, comprising the Algoma Central Railway lands, is managed as a forest property and for that reason for the purpose of all volume calculations and the assessment of allowable cut, these lands are treated as Crown lands in this report. For the remainder of patented lands, being in small holdings, a lower rotation was adopted than on Crown lands.

The annual allowable cut or net depletion allowable under management in the White River district is 101,429,650 cubic feet; 98,667,715 cubic feet from Crown lands and 2,761,935 cubic feet from patented lands. Of the total allowable cut, 97 per cent is on Crown lands and three per cent on patented lands.

### CROWN LANDS

The annual allowable cut for Crown lands represents 1.7 per cent of the primary growing stock or 25.8 cubic feet per acre of the productive forest area. Of the total allowable cut, 44,170,065 cubic feet or 45 per cent is coniferous species and 54,497,650 cubic feet or 55 per cent is of hardwood species. Since the rotation is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.4 per cent of the coniferous primary growing stock and 2.1 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 53 per cent is white and black spruce, 32 per cent jack pine, 13 per cent balsam fir and two per cent other conifers. The relationship of the allowable cut for a ten-year period to the volume of the coniferous primary growing stock by species is shown graphically, figure 12.

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the White River district.*

Species	Annual allowable cut cu. ft.
White pine.....	108,405
Jack pine.....	14,175,750
White spruce.....	6,788,245
Black spruce.....	16,481,285
Balsam fir.....	5,797,395
White cedar.....	781,885
Larch.....	37,100
TOTAL CONIFERS.....	44,170,065

<sup>1</sup> Method of calculation of allowable cut is given in Appendix, methods, allowable cut, page 24.

<sup>2</sup> Rotation by species, table 16, page 24.

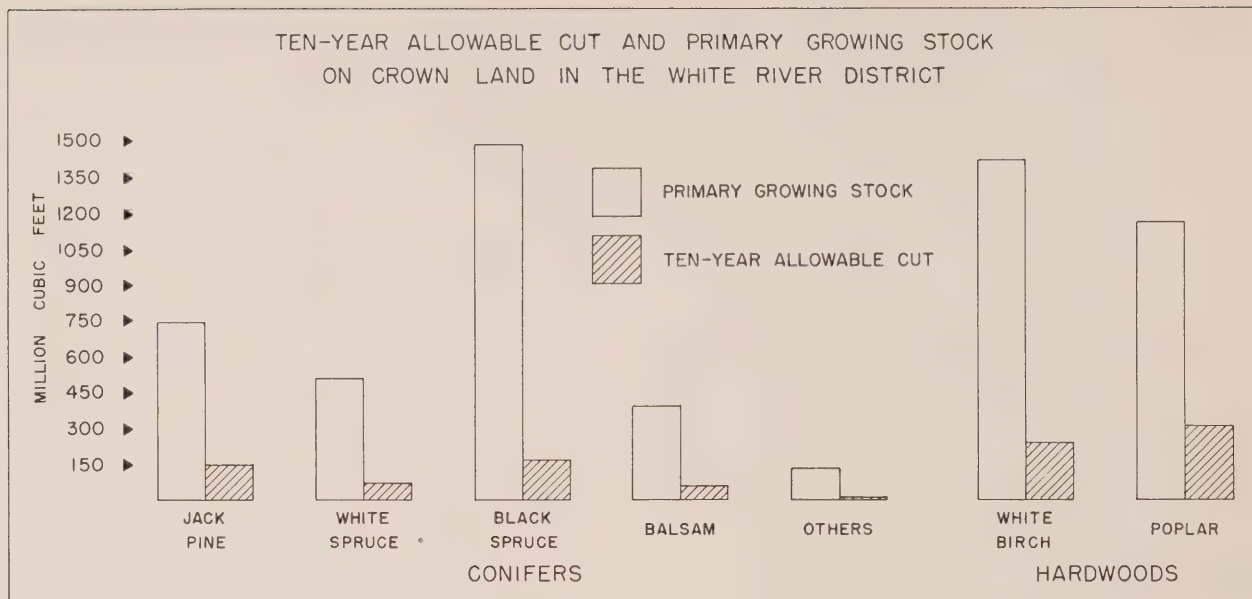


FIGURE 12

The species making up the hardwood content (table 12) shows that 57 per cent is poplar and another

TABLE 12. — *Annual allowable cut for hardwood species on Crown lands.*

Species	Annual allowable cut cu. ft.
White birch.....	23,588,175
Poplar.....	30,908,240
Other hardwoods.....	1,235
<b>TOTAL HARDWOODS.....</b>	<b>54,497,650</b>

43 per cent is white birch. Other hardwoods appear in inappreciable quantities. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods is shown graphically, figure 12.

#### PATENTED LANDS

The annual allowable cut for patented lands amounts to 2,761,935 cubic feet, which represents

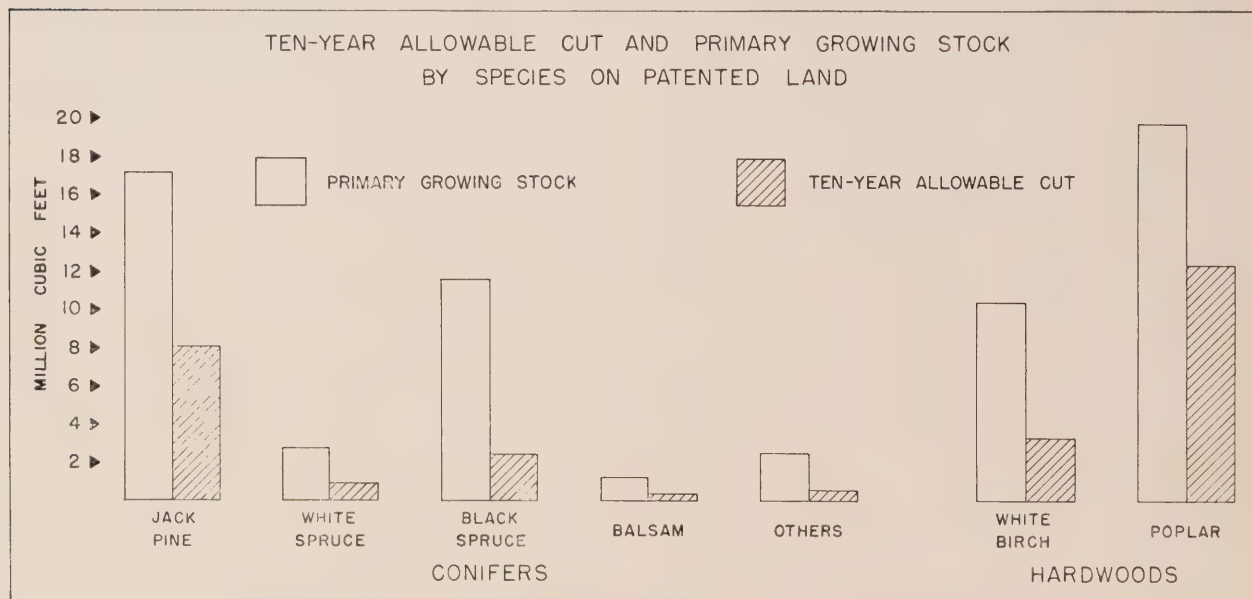


FIGURE 13



TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut cu. ft.
White pine	3,875
Jack pine....	804,180
White spruce	84,065
Black spruce.	238,990
Balsam fir.	36,445
White cedar	34,875
Larch	9,145
<b>TOTAL CONIFERS</b>	<b>1,211,575</b>
Yellow birch.....	575
White birch	321,445
Poplar	1,228,120
Red maple	270
<b>Total Hardwoods</b>	<b>1,550,360</b>

4.3 per cent of the primary growing stock, or 60.2 cubic feet per acre of the productive forest land.

The annual allowable cut on patented lands is 3.5 per cent of the coniferous primary growing stock and 5.2 per cent for the hardwoods. The high per cent of the primary growing stock being utilized as allowable cut is made possible by the presence of large volume of poplar managed on a thirty-year rotation.

The annual allowable cut for coniferous species on patented lands is 1,211,575 cubic feet and for hardwoods, 1,550,360 cubic feet. Over one-half of the allowable cut is for the two intolerant hardwood species, poplar and white birch, which together contribute 1,549,565 cubic feet to the total allowable cut. For the coniferous species jack pine is most important, followed by spruce. Balsam fir, cedar, larch and white pine are present in inappreciable volumes (fig. 13).



*Mixed pulpwood stands cover large areas of Northern Ontario.*

### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Return for the year ending March 31, 1951<sup>1</sup>, wood and forest products were cut on Crown lands in the White River district as follows:

Logs and booms.....	2,306,208 F.B.M. Doyle rule
Logs and booms.....	16,981 lineal feet
Posts.....	320 pieces
Pulpwood.....	182,905 cords
Fuelwood.....	1,703 cords

By the use of appropriate converting factors<sup>2</sup>, these amounts are expressed in gross total cubic feet and are comparable with the figures for allowable cut (table 14).

TABLE 14. — Gross total cubic volume of wood utilized in one year in the White River district.

Species	Wood utilized cu. ft.	Total per cent
White pine.....	18,523	...
Jack pine.....	1,143,016	5
Spruce, white and black.....	17,253,436	80
Balsam fir.....	3,127,337	15
White cedar.....	970	...
TOTAL.....	21,543,282	

The White River district was formed as a separate administrative district in 1949. There is, therefore, only one complete year for which the figures for utilization of forest products are available for the district. A comparison of the annual allowable cut

with the actual cut, for the one year, by species (table 15) shows that only conifers were utilized in the district and that the actual cut was less than the allowable cut (fig. 14). White and black spruce with a combined allowable cut of 23,270,000 cubic feet and an actual cut of 17,253,000 cubic feet are being utilized rather close to their allowable cut.

TABLE 15. — Comparison of allowable cut with actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
White pine.....	108	19
Jack pine.....	14,176	1,143
Spruce, white and black.....	23,270	17,253
Balsam fir.....	5,797	3,127
White cedar.....	782	1
Larch.....	37	.....
TOTAL CONIFERS.....	44,170	21,543
White birch.....	23,588	.....
Poplar.....	30,908	.....
Other hardwoods.....	1	.....
TOTAL HARDWOODS.....	54,497	.....

Balsam fir is also being well utilized, while jack pine shows a large surplus of allowable cut over and above present utilization. Excessive volumes of poplar and white birch remain apparently unutilized on Crown lands in the White River district.

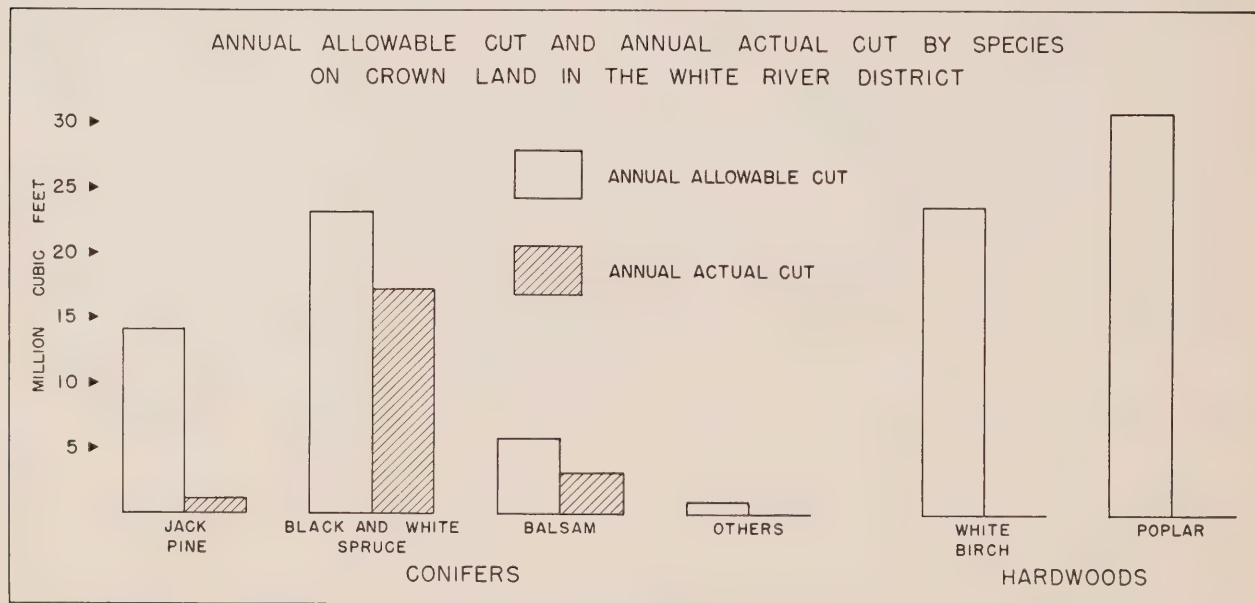


FIGURE 14

<sup>1</sup> Report of the Minister of Lands and Forests for the Province of Ontario for the fiscal year ending March 31, 1952.

<sup>2</sup> Method of conversion is given in Appendix.

There are no available records of the amount of wood cut on patented lands in the White River district.



# APPENDIX

## *Survey Methods*

● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Systematic sampling was carried out by field crews who collected all the data necessary for the making of the volume estimates. On the completion of the field work, finished forest type maps were prepared and areas determined by the usual methods<sup>1</sup>.

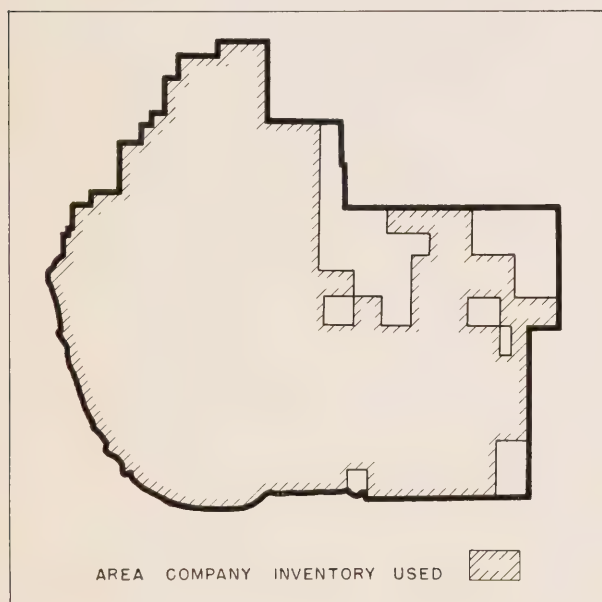


FIGURE 15

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes,

<sup>1</sup> A complete statement of the methods used in the inventory will be found in: Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

<sup>2</sup> Manual of Timber Management, Department of Lands and Forests, Ontario — Part II, page 50.

mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. In the White River district there are three regions or ecological sections, one of which was completely covered by company inventories. The per acre volumes in cubic feet, for the remaining two sections, are shown in tables 20 and 21.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the White River district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the White River district are shown in figure 15.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 26 cubic feet per acre, and for patented land to 47 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

## *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range from 10 to 120 years, the mature age class from 30 to 200 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

## *Rotation*

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class Ib<sup>2</sup> were used as rotation ages for all species except jack pine, where a rotation age of seventy years has been adopted as more suitable than the sixty years shown in these tables.

In calculations of allowable cut, a higher rotation



for Crown land was used than for patented land. The adoption of the lower rotation in the case of patented land is apparent from the reasons given in this report.

TABLE 16. — *Rotation ages by species.*

Species	Crown land	Patented land
	years	years
White pine.....	120	90
Jack pine.....	70	40
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
White cedar.....	200	100
Larch.....	100	75
Yellow birch.....	150	120
White birch.....	80	60
Poplar (all).....	50	30
Red maple.....	70	40

### Allowable Cut

#### (a) METHOD

The following two bases were available for calculation of allowable cut: (1) the volumes of the mature and immature age classes for each species, and (2) the adopted rotations.

The compilation was carried out in such a way that volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary growing stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory for the following reasons: (1) the ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 required by the French method. (2) In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. (3) The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

#### (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I),
- V.2. — denotes volume of immature timber (Age Class II),
- n — denotes rotation
- P — denotes annual allowable cut

By application of this formula, the following figures for the annual allowable cut were obtained:

Crown lands.....	138,794,670 cubic feet
Patented lands.....	2,761,935 cubic feet
TOTAL.....	141,556,605 cubic feet

This may be regarded as the maximum annual allowable cut for the district, fully justified if need of intensive utilization was substantiated by the present operations in the district. As may be seen from table 14, the actually utilized annual volume was only 21,543,282 cubic feet on Crown lands, or 16 per cent of 138,794,670 cubic feet of the maximum annual allowable cut on Crown lands in the White River district.

With rather a moderate demand on wood in view, and with a substantial accumulation of mature timber in the district, an advantageous opportunity arises where, by means of a normal, and not the maximum utilization, the normal size of age classes may be obtained. In this way a sound foundation would be created for a balanced sustained yield in the future.

During the period of a gradual normalization of age class areas a portion of mature and overmature stands will be held over and above their mature age. This involves certain losses in volume of those stands, where growing cull may not be balanced by volume increment of ageing stands. These losses, however, are not expected to be of importance inasmuch as the bulk of valuable stands is made of spruce not readily given to decay.

In view of the foregoing, the calculations of the annual allowable cut for Crown lands, carried out on the French method principles, were brought down to the normal level, according to the following procedure:

$$\begin{aligned} &\text{— Productive forest area} = 3,820,505 \text{ acres,} \\ &\text{— Age Class I volume per acre} = 2,066.08 \text{ cubic feet,} \\ &\text{— Mean annual increment to the rotation age} = 26.18 \text{ cubic feet,} \\ &\text{— Average rotation} = \frac{3,820,505 \times 2,066.08}{26.18} = 78.9, \text{ or } 80 \text{ years,} \\ &\text{Thus the normal area allotment} = \frac{3,820,505}{80} = 47,756 \text{ acres,} \\ &\text{Annual allowable cut} = 47,756 \times 2,066.08 = 98,667,715 \text{ cubic feet.} \end{aligned}$$

No modification of the result of calculations of the annual allowable cut by the French method on

<sup>1</sup> "Le traité pratique d'aménagement des forêts"—L. Pardé, 1930, Paris.

patented lands was made, for these lands appear in an inappreciable acreage and have no bearing on regulating yield for the district as a whole.

### Cull Factor

Where it was found necessary either to calculate net merchantable volume or to calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, the appropriate cull factors (table 17) were used throughout. These cull factors were taken from the figures for defect, made available from operations being carried out in the district.

### Volume Conversion

To convert the scaled volume of wood products expressed in merchantable units to the volume of standing timber in cubic feet, for comparisons of the volume utilized with the allowable cut in the same unit, the following method was adopted.

TABLE 17. — *Cull factors by species, White River district.*

Species	Cull per cent	Conversion factor
White pine.....	30	0.70
Jack pine.....	14	0.86
Spruce.....	10	0.90
Balsam.....	40	0.60
Cedar.....	34	0.66

### (a) CONVERSION OF BOARD-FOOT UNITS INTO CUBIC FOOT UNITS

The net merchantable volume of logs or booms is shown in number of pieces and total board-foot content. With these two figures the average board-foot per log was calculated. Assuming the length of log to be 16 feet and that of a boom 32 feet, the top-end diameter of an average log was read from the Board Foot Volume Table<sup>1</sup> at the point where the nearest to the average board-foot content appeared under 16 feet or 32 feet length of log or boom. To obtain the diameter of a log at the half-length point, the given top diameter was increased by one inch for 16-foot logs or by two inches for 32-foot logs. With the aid of the average half-length diameter and length of a log or boom, the cubic foot volume of an average piece was read from the Cubic Foot Log Rule<sup>1</sup>. This figure multiplied by number of pieces gave the net merchantable cubic foot volume

<sup>1</sup> Manual of Scaling Instructions — Department of Lands and Forests, Ontario, Toronto 1946.

of all logs and booms, which were shown in returns in pieces and board feet.

### (b) CONVERSION OF CORDWOOD INTO CUBIC CONTENT

Cubic content of cordwood was obtained on the basis of 80–90 cubic feet of solid wood to one cord, depending on the figures used by the operating companies.

### (c) ALLOWANCE FOR TOPS AND STUMPS

The net merchantable volumes were increased by the volume of tops and stumps with the aid of conversion factors. This was done by dividing the net merchantable volumes by the appropriate conversion factor (table 18).

The total net volume of certain wood products was obtained by a direct application of equivalent figures (table 19).

### (d) ALLOWANCE FOR CULL

The gross total volumes were obtained by dividing the net total volumes, that is, merchantable volumes plus tops and stumps, by appropriate conversion factors (table 17).

TABLE 18. — *Volume of tops and stumps in per cent of merchantable volume and the relative conversion factors.*

Species	Tops and stumps per cent	Conversion factor
Cordwood:		
Jack pine ..	11.1	0.889
Spruce.....	6.6	0.934
Balsam fir.....	5.9	0.941
Cedar.....	15.0	0.850
White birch.....	15.0	0.850
Poplar.....	15.0	0.850
Sawlogs:		
Pine, white and red.....	15.0	0.850
Jack pine.....	12.0	0.880
White spruce.....	12.0	0.880
Black spruce.....	10.0	0.900
Balsam fir.....	10.0	0.900
Cedar.....	15.0	0.850
Hard maple.....	25.0	0.750
Yellow birch.....	30.0	0.700
White birch.....	20.0	0.800
Poplar.....	18.0	0.820

TABLE 19. — *Equivalent figures for various wood products.*

Product	Unit in use	Equivalent standing timber cu. ft.
Railway ties.....	1 piece	12.0
Pit props.....	1 cubic foot	1.3
Fencing.....	1 post	2.0
Poles and piling.....	1 piece	20.0
Shingles.....	1000 pieces	22.0
Fence rails.....	1 piece	3.0

TABLE 20. — *Volume of the primary growing stock in cubic feet per acre.*

Central Plateau Section — 1949

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9'' 10'' up	155.4 211.2	151.8 206.2	132.7 180.3	42.9 28.5	613.3 73.5	596.8 71.5	509.5 61.0	33.3 .....
White spruce.....	4''-9'' 10'' up	17.0 141.6	16.6 138.3	14.5 120.9	..... 44.5	5.9 14.5	5.7 14.1	4.9 12.0	1.6 .....
Black spruce.....	4''-9'' 10'' up	1224.1 257.9	1195.4 251.8	1045.3 220.2	595.4 178.8	979.9 73.8	953.4 71.8	814.0 61.3	534.9 44.0
Balsam fir.....	4''-9'' 10'' up	191.7 55.3	187.2 54.0	163.7 47.2	51.2 3.7	53.2 7.9	51.8 7.7	44.2 6.6	35.8 .....
White cedar.....	4''-9'' 10'' up	39.5 38.5	38.6 37.6	33.8 32.8	10.3 .....	.....	.....	.....	57.1 60.0
Larch.....	4''-9'' 10'' up	.....	.....	.....	.....	12.2	11.9	10.2	15.4
TOTAL CONIFERS.....	4''-9'' 10'' up	1627.7 704.5	1589.6 687.9	1390.0 601.4	699.8 255.5	1664.5 169.7	1619.6 165.1	1382.8 140.9	678.1 104.0
White birch.....	4''-9'' 10'' up	66.4 66.2	64.9 64.6	56.7 56.5	15.8 18.4	75.9 13.8	73.9 13.4	63.0 11.5	14.6 .....
Poplar (all).....	4''-9'' 10'' up	31.2 104.0	30.5 101.5	26.7 88.7	9.2 36.3	85.8 28.3	83.5 27.5	71.3 23.5	16.3 .....
TOTAL HARDWOODS.....	4''-9'' 10'' up	97.6 170.2	95.4 166.1	83.4 145.2	25.0 54.7	161.7 42.1	157.4 40.9	134.3 35.0	30.9 .....
GRAND TOTAL.....	4''-9'' 10'' up	1725.3 874.7	1685.0 854.0	1473.4 746.6	724.8 310.2	1826.2 211.8	1777.0 206.0	1517.1 175.9	709.0 104.0
TOTAL 4'' UP.....		2600.0	2539.0	2220.0	1035.0	2038.0	1983.0	1693.0	813.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9'' 10'' up	4.5 57.4	4.1 53.5	3.2 41.6	1.3 17.3	85.6 45.1	77.5 40.8	56.5 29.8	21.7 11.5
White spruce.....	4''-9'' 10'' up	34.6 31.4	32.2 29.3	25.0 22.8	10.4 9.5	11.1 20.2	10.1 18.2	7.3 13.3	2.8 5.1
Black spruce.....	4''-9'' 10'' up	99.6 7.7	92.7 7.2	72.0 5.6	30.0 2.3	84.4 3.7	76.4 3.3	55.8 2.4	21.4 0.9
Balsam fir.....	4''-9'' 10'' up	56.8 42.2	52.9 39.3	41.2 30.5	17.1 12.7	22.7	20.5	15.0	5.8
TOTAL CONIFERS.....	4''-9'' 10'' up	195.5 138.7	181.9 129.3	141.4 100.5	58.8 41.8	203.8 69.0	184.5 62.3	134.6 45.5	51.7 17.5
White birch.....	4''-9'' 10'' up	671.0 298.6	624.6 278.0	485.6 216.1	201.8 89.8	408.1 23.7	369.3 21.5	269.5 15.7	103.6 6.0
Poplar (all).....	4''-9'' 10'' up	1408.3 1413.9	1311.0 1316.2	1019.2 1023.2	423.6 425.2	1873.6 262.8	1695.6 237.8	1237.2 173.5	475.5 66.7
TOTAL HARDWOODS.....	4''-9'' 10'' up	2079.3 1712.5	1935.6 1594.2	1504.8 1239.3	625.4 515.0	2281.7 286.5	2064.9 259.3	1506.7 189.2	579.1 72.7
GRAND TOTAL.....	4''-9'' 10'' up	2274.8 1851.2	2117.5 1723.5	1646.2 1339.8	684.2 556.8	2485.5 355.5	2249.4 321.6	1641.3 234.7	630.8 90.2
TOTAL 4'' UP.....		4126.0	3841.0	2986.0	1241.0	2841.0	2571.0	1876.0	721.0



TABLE 20 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9'' 10'' up	158.1 350.2	154.1 341.5	130.0 288.1	214.1 .....	360.0 97.4	340.5 92.1	269.1 72.8	122.3 33.1
White spruce.....	4''-9'' 10'' up	81.4 243.0	79.4 236.9	67.0 199.8	9.4 338.1	14.4 32.7	13.6 31.0	10.8 24.4	4.9 11.1
Black spruce.....	4''-9'' 10'' up	366.3 203.3	357.1 198.3	301.2 167.3	121.2 151.2	493.5 69.2	466.8 65.5	368.9 51.7	167.7 23.5
Balsam fir.....	4''-9'' 10'' up	199.4 56.6	194.4 55.2	164.0 46.5	18.1 .....	71.6 31.0	67.7 29.3	53.5 23.2	24.4 10.5
Larch.....	4''-9'' 10'' up	..... .....	..... .....	..... .....	..... .....	7.5 0.8	7.1 0.8	5.6 0.6	2.5 0.3
TOTAL CONIFERS.....	4''-9'' 10'' up	805.2 853.1	785.0 831.9	662.2 701.7	362.8 489.3	947.0 231.1	895.7 218.7	707.9 172.7	321.8 78.5
White birch.....	4''-9'' 10'' up	453.0 278.8	441.7 271.8	372.6 229.3	98.7 .....	381.9 72.7	361.2 68.8	285.4 54.4	129.8 24.7
Poplar (all) .....	4''-9'' 10'' up	388.8 826.1	379.1 805.5	319.7 679.5	410.2 29.0	902.3 237.0	853.5 224.1	674.5 177.1	306.7 80.5
TOTAL HARDWOODS.....	4''-9'' 10'' up	841.8 1104.9	820.8 1077.3	692.3 908.8	508.9 29.0	1284.2 309.7	1214.7 292.9	959.9 231.5	436.5 105.2
GRAND TOTAL.....	4''-9'' 10'' up	1647.0 1958.0	1605.8 1909.2	1354.5 1610.5	871.7 518.3	2231.2 540.8	2110.4 511.6	1667.8 404.2	758.3 183.7
TOTAL 4'' UP.....		3605.0	3515.0	2965.0	1390.0	2772.0	2622.0	2072.0	942.0



TABLE 21. — *Volume of the primary growing stock in cubic feet per acre.**Central Transition Section — 1951*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9'' 10'' up	670.9 549.0	646.0 528.6	488.6 399.7	16.7 87.4	648.2 139.4	630.3 135.6	554.0 119.1	245.1 52.7
White spruce.....	4''-9'' 10'' up	37.4 51.4	36.0 49.5	27.2 37.5	81.0 132.2	17.1 10.8	16.6 10.5	14.6 9.2	6.5 4.1
Black spruce.....	4''-9'' 10'' up	812.0 248.0	781.9 238.8	591.2 180.6	42.0 79.8	759.4 88.1	738.4 85.7	648.9 75.3	287.2 33.3
Balsam fir.....	4''-9'' 10'' up	44.8 5.5	43.2 5.3	32.7 4.0	94.7 .....	19.2 0.7	18.7 0.7	16.4 0.6	7.2 0.3
White cedar.....	4''-9'' 10'' up	98.6 147.2	94.9 141.7	71.8 107.2	36.4 175.1	36.6 43.2	35.6 42.0	31.3 36.9	13.9 16.3
Larch.....	4''-9'' 10'' up	17.0 0.8	16.3 0.8	12.3 0.6	.....	46.0 1.9	44.6 1.9	39.3 1.6	17.4 0.7
TOTAL CONIFERS.....	4''-9'' 10'' up	1680.7 1001.9	1618.3 964.7	1223.8 729.6	270.8 474.5	1526.5 284.1	1484.2 276.4	1304.5 242.7	577.3 107.4
White birch.....	4''-9'' 10'' up	94.5 38.8	91.0 37.3	68.8 28.2	41.9 50.3	78.9 10.8	76.8 10.5	67.5 9.2	29.8 4.1
Poplar (all).....	4''-9'' 10'' up	53.8 91.3	51.8 87.9	39.2 66.4	8.5 .....	64.6 29.1	62.8 28.3	55.2 24.9	24.4 11.0
TOTAL HARDWOODS.....	4''-9'' 10'' up	148.3 130.1	142.8 125.2	108.0 94.6	50.4 50.3	143.5 39.9	139.6 38.8	122.7 34.1	54.2 15.1
GRAND TOTAL.....	4''-9'' 10'' up	1829.0 1132.0	1761.1 1089.9	1331.8 824.2	321.2 524.8	1670.0 324.0	1623.8 315.2	1427.2 276.8	631.5 122.5
TOTAL 4'' UP.....		2961.0	2851.0	2156.0	846.0	1994.0	1939.0	1704.0	754.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4''-9'' 10'' up	59.8 88.3	58.4 86.1	48.7 71.8	.....	94.7 75.6	86.9 69.4	60.0 47.9	22.2 17.7
White spruce.....	4''-9'' 10'' up	26.7 68.1	26.1 66.4	21.8 55.4	40.2 239.0	19.1 27.7	17.6 25.4	12.1 17.6	4.5 6.5
Black spruce.....	4''-9'' 10'' up	33.3 11.1	32.5 10.9	27.1 9.1	109.8 32.1	19.4 4.0	17.9 3.6	12.3 2.5	4.6 0.9
Balsam fir.....	4''-9'' 10'' up	39.1 5.3	38.2 5.2	31.9 4.3	4.5 .....	25.5 2.2	23.4 2.0	16.1 1.4	6.0 0.5
White cedar.....	4''-9'' 10'' up	3.0 8.8	2.9 8.7	2.4 7.2	.....	0.6 1.6	0.5 1.5	0.4 1.0	0.1 0.4
TOTAL CONIFERS.....	4''-9'' 10'' up	161.9 181.6	158.1 177.3	131.9 147.8	154.5 271.1	159.3 111.1	146.3 101.9	100.9 70.4	37.4 26.0
White birch.....	4''-9'' 10'' up	485.6 307.9	474.2 300.6	395.4 250.7	229.2 423.9	473.6 54.4	434.7 49.9	300.1 34.5	111.0 12.7
Poplar (all).....	4''-9'' 10'' up	881.0 943.0	860.1 920.7	717.4 767.8	47.3 .....	1107.1 223.5	1016.0 205.2	701.5 141.6	259.5 52.4
TOTAL HARDWOODS.....	4''-9'' 10'' up	1366.6 1250.9	1334.3 1221.3	1112.8 1018.5	276.5 423.9	1580.7 277.9	1450.7 255.1	1001.6 176.1	370.5 65.1
GRAND TOTAL.....	4''-9'' 10'' up	1528.5 1432.5	1492.4 1398.6	1244.7 1166.3	431.0 695.0	1740.0 389.0	1597.0 357.0	1102.5 246.5	407.9 91.1
TOTAL 4'' UP.....		2961.0	2891.0	2411.0	1126.0	2129.0	1954.0	1349.0	499.0

TABLE 21 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9'' 10'' up	.....	.....	.....	.....	0.8 28.0	0.8 25.5	0.6 19.6	.....
Jack pine.....	4''-9'' 10'' up	282.2 319.4	256.8 290.8	203.4 230.2	8.6 24.3	592.2 124.8	541.6 114.1	415.6 87.6	.....
White spruce.....	4''-9'' 10'' up	83.5 208.3	76.0 189.6	60.1 150.2	58.7 245.6	33.8 33.3	30.9 30.5	23.7 23.4	6.8 9.3
Black spruce.....	4''-9'' 10'' up	154.5 86.1	140.6 78.4	111.3 62.1	44.4 101.6	163.0 21.6	149.1 19.8	114.4 15.2	108.3 104.5
Balsam fir.....	4''-9'' 10'' up	87.6 14.7	79.7 13.4	63.1 10.6	21.6 .....	31.0 2.6	28.3 2.4	21.8 1.8	25.9 .....
White cedar.....	4''-9'' 10'' up	18.3 56.9	16.6 51.9	13.2 41.0	6.8 51.8	5.5 11.3	5.0 10.3	3.8 8.0	20.3 73.5
Larch.....	4''-9'' 10'' up	.....	.....	.....	.....	.....	.....	.....	2.8 .....
TOTAL CONIFERS.....	4''-9'' 10'' up	626.1 685.4	569.7 624.1	451.1 494.1	140.1 423.3	826.3 221.6	755.7 202.6	579.9 155.6	164.1 187.3
Yellow birch.....	4''-9'' 10'' up	.....	.....	.....	.....	.....	.....	.....	4.1 40.0
White birch.....	4''-9'' 10'' up	372.7 355.2	339.3 323.3	268.6 256.1	124.8 253.5	308.0 70.9	281.7 64.8	216.2 49.7	94.8 76.7
Poplar (all).....	4''-9'' 10'' up	325.4 643.2	296.2 585.4	234.6 463.5	16.9 69.4	738.1 233.1	675.0 213.2	518.0 163.6	104.3 23.1
Red maple.....	4''-9'' 10'' up	.....	.....	.....	.....	.....	.....	.....	5.6 .....
TOTAL HARDWOODS.....	4''-9'' 10'' up	698.1 998.4	635.5 908.7	503.2 719.6	141.7 322.9	1046.1 304.0	956.7 278.0	734.2 213.3	208.8 139.8
GRAND TOTAL.....	4''-9'' 10'' up	1324.2 1683.8	1205.2 1532.8	954.3 1213.7	281.8 746.2	1872.4 525.6	1712.4 480.6	1314.1 368.9	372.9 327.1
TOTAL 4'' UP.....		3008.0	2738.0	2168.0	1028.0	2398.0	2193.0	1683.0	700.0

Common and Botanical Names of Tree Species  
included in Timber Estimates

CONIFERS

White pine.....*Pinus strobus* L.  
 Jack pine.....*Pinus banksiana* Lamb.  
 White spruce.....*Picea glauca* (Moench) Voss.  
 Black spruce.....*Picea mariana* (Mill.) BSP.  
 Balsam fir.....*Abies balsamea* (L.) Mill.

White cedar.....*Thuja occidentalis* L.  
 Larch.....*Larix laricina* (Du Roi) Koch.

HARDWOODS

Yellow birch.....*Betula lutea* Michx. f.  
 White birch.....*Betula papyrifera* Marsh.  
 Red maple.....*Acer rubrum* L.  
 Poplar.....*Populus tremuloides* Michx.  
                   *Populus tacamahacca* Mill.  
                   *Populus grandidentata* Michx.



## *Notes*

---

## *Notes*

---

## *Notes*

---







**Hon. Welland S. Gemmell**  
*Minister*

**F. A. MacDougall**  
*Deputy Minister*

Report No. 10 of the  
**SUDBURY DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management

Ontario Department of Lands and Forests





# *Forest Resources Inventory*

— 1953 —

Report No. 10 of the  
SUDBURY DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests

# PREFACE

● One of the important undertakings of the Department of Lands and Forests, in recent years is a province-wide survey of forest resources. The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to Ontario, one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

The past half century, little more than one-half a rotation period in forest growth has witnessed the origin and rise of the pulp and paper industry to the position of "Canada's Leading Industry." Advances through research and development in processes of manufacture are going forward at an accelerated rate. The possibility of manufacturing present wood waste, unused species and qualities, economically into marketable products offers a challenge to research; their quantities give it direction. Modern forest inventory has therefore shifted from its former position of concentration on giving presently utilizable volumes, to one of presenting the forest resource picture as a whole. The volume of the primary growing stock in cubic feet gives the total wood resources. From these figures, not only can the volume of utilizable wood under present economic and industrial conditions be calculated, but these estimates may be adjusted also, to the progressive change in utilization standards in a rapidly developing economy.

For purposes of administration of the renewable natural resources of the Province, the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these forest administrative districts, totalling 172,000 square miles, and comprising the accessible forest area of Ontario. This report deals with the results of the inventory in the Sudbury district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the province as a whole. This objective is being given material effect through the use of the inventory in the preparation of long term timber management plans.



# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	21
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	25
AREAS.....	9	APPENDIX.....	27
FOREST LAND OWNERSHIP.....	9	SURVEY METHODS.....	27
AGE CLASSES.....	10	MEAN ANNUAL INCREMENT.....	27
REGIONAL FOREST TYPES.....	11	AGE CLASSES.....	27
COVER TYPES.....	12	ROTATION.....	27
VOLUME.....	14	ALLOWABLE CUT.....	28
CONIFERS VS. HARDWOODS.....	14	CULL FACTOR.....	29
SAWLOGS VS. PULPWOOD.....	15		

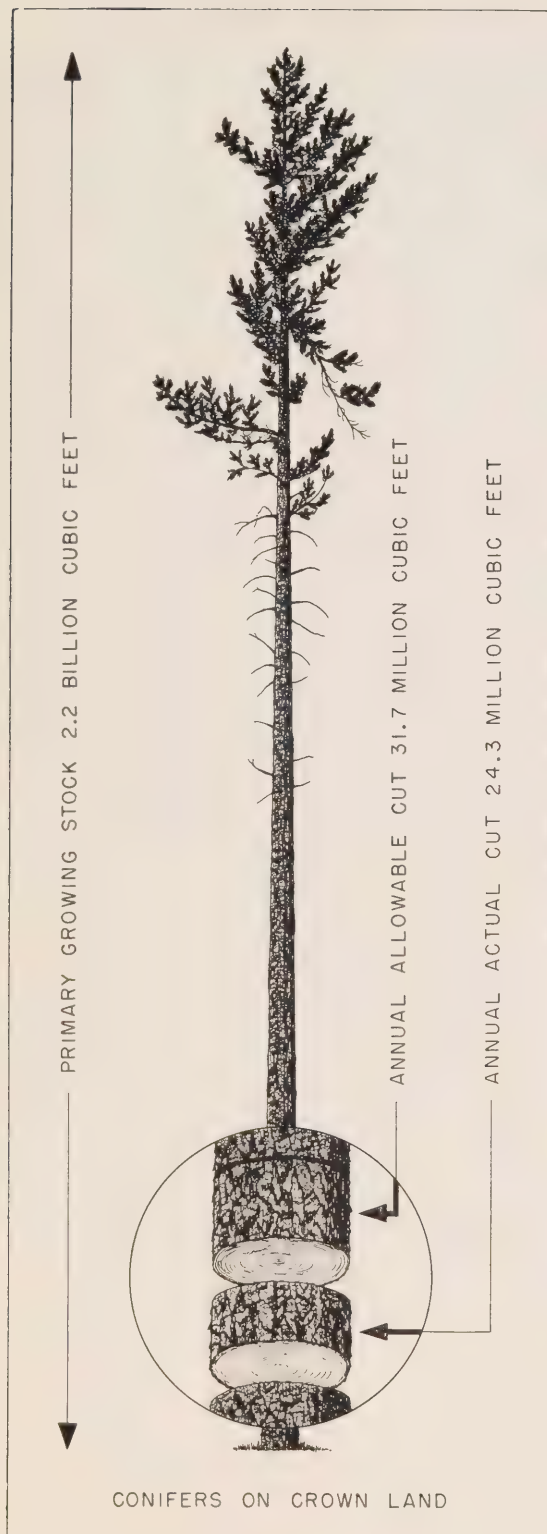
## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES.....	9	FIG. 12 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL HARDWOOD SPECIES ON CROWN LAND BY AGE AND SIZE CLASSES.....	17
FIG. 2 — SUDBURY DISTRICT, 1952.....	10	FIG. 13 — VOLUME OF IMMATURE TIMBER BY SIZE CLASSES ON PATENTED LAND IN THE SUDBURY DISTRICT.....	17
FIG. 3 — LAND OWNERSHIP WITHIN THE SUDBURY DISTRICT.....	10	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON CROWN LAND IN THE SUDBURY DISTRICT.....	22
FIG. 4 — AGE CLASS DISTRIBUTION IN THE SUDBURY DISTRICT.....	11	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON CROWN LAND IN THE SUDBURY DISTRICT.....	23
FIG. 5 — ECOLOGICAL DIVISIONS.....	12	FIG. 16 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF CONIFERS ON PATENTED LAND IN THE SUDBURY DISTRICT.....	24
FIG. 6 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	13	FIG. 17 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK OF HARDWOODS ON PATENTED LAND IN THE SUDBURY DISTRICT.....	24
FIG. 7 — VOLUME OF PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	14	FIG. 18 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS BY SPECIES ON CROWN LAND IN THE SUDBURY DISTRICT.....	25
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SPECIES AND AGE CLASSES IN THE SUDBURY DISTRICT.....	15	FIG. 19 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF HARDWOODS BY SPECIES ON CROWN LAND IN THE SUDBURY DISTRICT.....	26
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SIZE CLASSES.....	16	FIG. 20 — AREA COMPANY INVENTORY USED.....	27
FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LAND BY SIZE CLASSES.....	16		
FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL CONIFEROUS SPECIES ON CROWN LAND BY AGE AND SIZE CLASSES.....	16		





# SURVEY HIGHLIGHTS



1. The total area of the Sudbury district is 4,573,093 acres or 7,145 square miles. The cover type distribution of 3,580,051 acres of productive forest land is 57 per cent mixedwoods, 19 per cent hardwoods, 16 per cent coniferous and 8 per cent reproducing forest. By age classes this area is 22 per cent reproducing forest and young growth, 56 per cent immature forest and 22 per cent mature forest area.

2. Privately owned lands comprise 586,386 acres or 13 per cent of the district. Developed agricultural lands occupy 102,746 acres or 18 per cent of the patented land area.

3. The district lies within the mining zone of the province, and this industry has formed the major industrial and commercial enterprise of the area.

4. The southern part of the Sudbury district originally contained some fine red and white pine stands mixed with maple and yellow birch. Many of the original pine areas, as a consequence of logging and fires, are now covered with stands of poplar and white birch. In the north, spruce, jack pine and balsam fir are important components of the stands.

5. The total timber resources of the Sudbury district are nearly 4.5 billion cubic feet, 4.2 billion cubic feet on Crown lands and 380 million cubic feet on patented lands. Fifty-one per cent of the primary growing stock is made up of conifers and 49 per cent hardwoods. There are 2.5 billion cubic feet in the pulpwood and cordwood size class and 2 billion cubic feet in the sawlog class.

6. The annual allowable cut on Crown lands is 58.1 million cubic feet, 31.7 million cubic feet for conifers and 26.4 million cubic feet for hardwoods, before any deductions are made for losses or inoperability.

7. The annual allowable cut on patented lands is 8.8 million cubic feet, 31 per cent is conifers and 69 per cent is hardwoods.

8. A comparison of the annual allowable cut with the actual utilization of timber on Crown lands shows a 20 per cent overcut in jack pine, and an undercut in all other species utilized on Crown lands. The cut of conifers was 77 per cent of their allowable cut, whereas only 13 per cent of the allowable cut for hardwoods was actually utilized.





MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50

MARCH 1953



*Forest resources inventory photograph of the City of Sudbury taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area of the Sudbury district, excluding Indian Reserve lands as well as the adjacent islands in Lake Huron, is 4,573,093 acres (table 1), 7,145 square miles, made up of 198 surveyed townships. Water covers an area of 416,373 acres, or 9 per cent of the total area, leaving a net land area of 4,156,720 acres. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 386,030 acres, or over 8 per cent of the total area. Non-forested lands, including lands permanently withdrawn from timber production, comprise 190,639 acres or just over four per cent of the total area (fig. 1). In this classification are developed agricultural lands amounting to 111,782 acres, non-reproducing burn amounting to 36,527 acres, unclassified lands account-

ing for 30,430 acres, and pasture lands totalling 11,900 acres. Owing to the rocky nature of the soil, it seems unlikely that agricultural development will expand far beyond its present limited boundaries in this district.

The Sudbury district lies within the nickel mining belt of the province and this industry has formed the major industrial and commercial enterprise of the area. Owing partly to this industry, major demands

TABLE 1. — *Total area classification into broad land and ownership groupings.*

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	3,199,546	380,505	3,580,051
Non-forested land <sup>2</sup>			
Developed agricultural land.....	9,036	102,746	111,782
Grass and meadow land.....	2,528	9,372	11,900
Non-reproducing burn.....	31,337	5,190	36,527
Unclassified land <sup>3</sup> .....	6,713	23,717	30,430
TOTAL.....	49,614	141,025	190,639
Non-productive forest <sup>4</sup>			
Open muskeg.....	154,295	6,101	160,396
Treed muskeg (scrub).....	16,598	7,244	23,842
Brush, alder and flooded land.....	77,399	23,495	100,894
Rock outcrop.....	63,075	10,140	73,215
Barrens.....	9,807	17,876	27,683
TOTAL.....	321,174	64,856	386,030
Water.....	416,373		416,373
TOTAL AREA.....	3,986,707	586,386	4,573,093

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class owing to very low productivity.

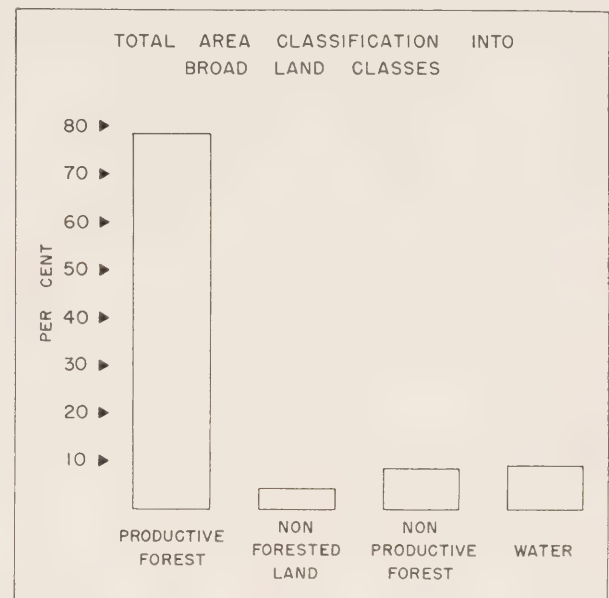


FIGURE 1

have been made on the productive forest, which covers 3,580,051 acres, or over 78 per cent of the total area (fig. 1). This district originally contained some of the finest red and white pine stands in Ontario, mixed with tolerant hardwoods, maple and yellow birch, in the southern part of the district. In the northern part of the district, black and white spruce, as well as jack pine and balsam fir become important components of the stands. Many of the original pine areas, as a consequence of logging and forest fires, are now covered with second growth poplar and white birch stands.

## Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain.

Lands suitable for agriculture have been opened for settlement and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort and for

issued. Grass and meadow lands are not extensive in the district, covering only 9,372 acres under private ownership and 2,528 acres owned by the Crown.

### Age Classes

For sustained timber yields a forest should be made up of stands of all age classes and stages of development from seedlings to mature timber in such proportions that when one group of trees is harvested, another is ready to take its place. The forests of Ontario generally show a preponderance of the mature age class which, if a normal distribution of age classes is to be obtained, should be cut at a uniform rate to produce a sustained balanced cut from year to year in the future.

For the Sudbury district as a whole, 771,134 acres or 22 per cent of the productive forest is mature, 2,006,182 acres or 56 per cent is immature, and 802,735 acres or 22 per cent is in the young growth and reproducing forest class (table 2).

The age class distribution for the Crown land area shows 24 per cent of the productive forest in the mature age class, 58 per cent immature and the remaining 18 per cent in the young growth and reproducing forest class (fig. 4). In comparison, patented lands show a reduced area in the mature age class with 4 per cent mature, 42 per cent immature and 54 per cent in the young growth and reproducing forest class. Unless the cut on patented lands is reduced to the

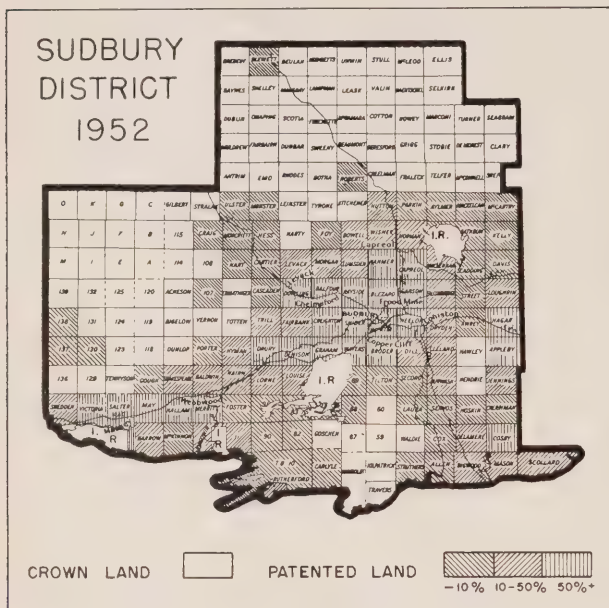


FIGURE 2

other uses. All of these various types of ownership are grouped under "Patented lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at the time the patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands therefore presents a complicated picture. In the course of the inventory no attempt has been made to record separately, timber occurring on patented lands but reserved to and owned by the Crown.

Of the total area of the Sudbury district of 4,573,093 acres, 3,986,707 acres are in the ownership of the Crown and 586,386 acres is patented land, 87 per cent of the total area is Crown land and 13 per cent patented land (fig. 2). Considering only the productive forest land totalling 3,580,051 acres, 89 per cent is in Crown ownership and 11 per cent is patented land (fig. 3).

Developed agricultural lands occupy 102,746 acres or 18 per cent of the patented land area. An additional area of 9,306 acres of developed agricultural lands are in Crown ownership. These are for the most part located lands for which letters patent have not been

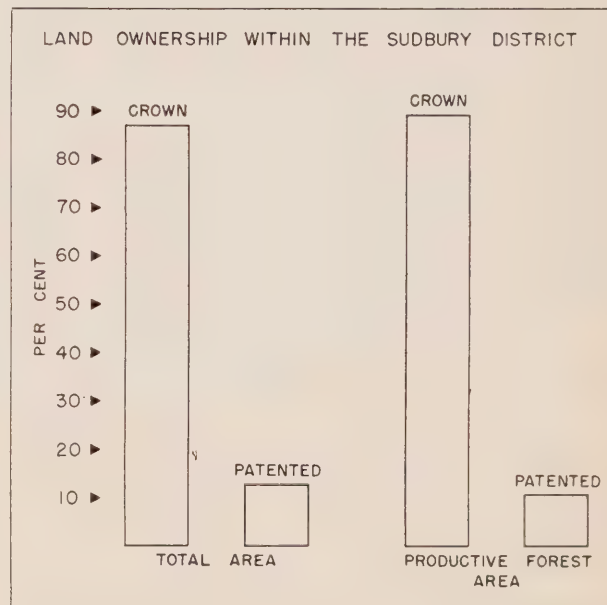


FIGURE 3

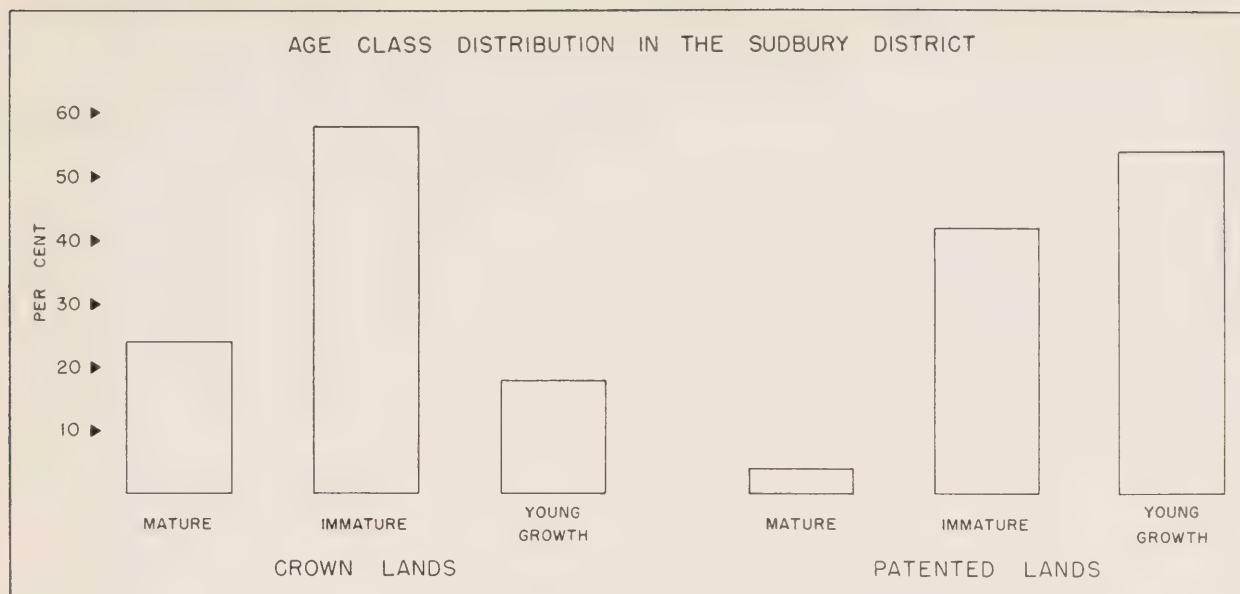


FIGURE 4

point that only improvement cuttings and thinnings are utilized and the timber permitted to grow to larger sizes, these lands can produce very little timber above pulpwood and cordwood size classes.

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	Productive forest
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	170,218	1,487	171,705	5
Hardwood.....	31,872	3,320	35,192	1
Mixedwoods.....	555,431	8,806	564,237	16
TOTAL.....	757,521	13,613	771,134	22
Immature forest:				
Coniferous.....	299,429	15,287	314,716	9
Hardwood.....	405,454	46,425	451,879	12
Mixedwoods.....	1,141,443	98,144	1,239,587	35
TOTAL.....	1,846,326	159,856	2,006,182	56
Young growth:				
Coniferous.....	61,123	3,988	65,111	2
Hardwood.....	186,417	40,080	226,497	6
Mixedwoods.....	177,446	50,464	227,910	6
TOTAL.....	424,986	94,532	519,518	14
Reproducing forest.....	170,713	112,504	283,217	8
TOTAL PRODUCTIVE FOREST.....	3,199,546	380,505	3,580,051	100

### Regional Forest Types

The regional distribution of forest types in Ontario is influenced by the lowering in temperature from south to north and a reduction in rainfall and general atmospheric humidity from east to west. The regularity of the response of forest growth to these two variable factors is modified by the proximity of large bodies of water, especially the "Great Lakes" system, topography, the distribution of broad soil types and other local conditions. These factors are expressed in the limits of distribution of certain commercial tree species and in the volume and growth rate of the forest. Separate volume and yield tables are made for each region or section and they serve as units in the compilation of volume estimates. In the Sudbury district the northern limits of the distribution of tolerant hardwoods, maple and yellow birch and others and white and red pine in consolidated stands serve to separate the forests of the district into four major sections (fig. 5) as follows:

1. The Algonquin section in the south-east covering 32 per cent of the total area of the district.

2. The Timagami section, taking up the mid-portion of the district comprising 62 per cent of the total area of the district.

3. The Central Transition section in the north-west portion of the district covering 2 per cent of the total area.

4. The Algoma section in the south-west covering 4 per cent of the total area.

The Algonquin section is characterized by the pres-



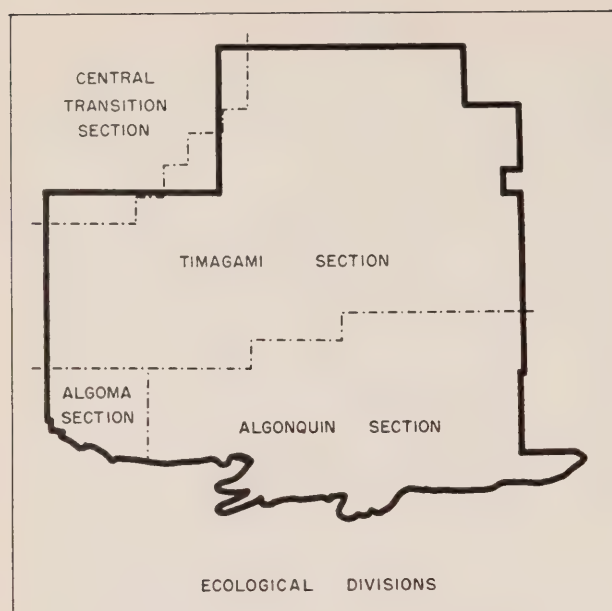


FIGURE 5

ence of tolerant hardwoods, maple and yellow birch in consolidated commercial stands on most of the deep-soils and well-drained sites. These stands originally contained an admixture of white pine, which reached its finest individual development as isolated trees in these hardwood stands and was almost all removed in the earlier logging operations. Lack of regeneration of pine has left these stands as virtually pure hardwoods. In more recent years yellow birch and some of the best quality maple has become commercially valuable for veneer stock and lumber, and these stands are being operated a second time. On the lighter sandy soils white and red pine stands prevailed. For the most part these have been logged and as a rule burned over, giving rise to large areas of immature poplar and white birch stands with a small admixture of conifers.

The Timagami section is noteworthy for the presence of extensive areas of stands of white and red pine which in the absence of intensive competition from tolerant hardwood components have a tendency to grow in relatively pure stands on all of the well-drained sites. Along with the pine are found the characteristic components of the Boreal forest, black and white spruce, balsam fir and jack pine.

The Central Transition section covering only 2 per cent of the area of the district belongs to the Boreal forest zone. White pine and tolerant hardwoods are represented only by a few scattered outliers. Spruce-fir stands occupy all of the well-drained heavier soils

as a mature forest. Jack pine stands of fine development are found on coarse sand and gravelly soils. Pure stands of black spruce occupy the low areas of poorly drained soils gradually tapering off in growth rate to the open muskegs common to this section. The relatively intolerant poplar and white birch are the only important broadleaved tree species. These are aggressive in taking over logged and burned areas on the well-drained uplands where they also form a component of the mature stands.

The Algoma section covering 4 per cent of the total area is a western extension of the Algonquin section. Hemlock, beech and a number of other tolerant hardwoods of the Algonquin section are found only as scattered outliers in the Algoma section. White and red pine, maple and yellow birch are present in consolidated commercial stands.

### Cover Types

Within the Sudbury district 20 native tree species have been recorded, although only 12 species (table 3) make up over 98 per cent of the total wood volume. Three main cover types are recognized, coniferous, hardwood, and mixedwoods. The coniferous type

TABLE 3. — *Percentage of the primary growing stock on productive forest lands in the Sudbury district in mature and immature stands, by species.*

Species	Mature age class per cent	Immature age class per cent	Productive forest per cent
White pine.....	13.5	10.0	11.4
Red pine.....	5.5	3.4	4.3
Jack pine.....	15.9	7.6	10.9
White spruce.....	7.9	6.2	6.9
Black spruce.....	7.3	6.2	6.6
Balsam fir.....	2.6	4.5	3.8
Hemlock.....	4.5	2.7	3.4
White cedar.....	3.8	4.0	3.9
Larch.....	*	0.2	0.1
<b>TOTAL CONIFERS.....</b>	<b>61.0</b>	<b>44.8</b>	<b>51.3</b>
Hard maple.....	3.4	3.0	3.1
Yellow birch.....	7.3	3.2	4.9
Beech.....	*	*	*
White elm.....	0.1	*	*
Ironwood.....	*	0.1	0.1
Red oak.....	*	0.5	0.3
White birch.....	16.2	21.5	19.4
Poplar (all).....	11.2	25.1	19.5
Red maple.....	0.3	1.0	0.7
Black and white ash.....	0.4	0.8	0.6
Basswood.....	0.1	*	0.1
<b>TOTAL HARDWOODS.....</b>	<b>39.0</b>	<b>55.2</b>	<b>48.7</b>

\*Less than 0.05 per cent.

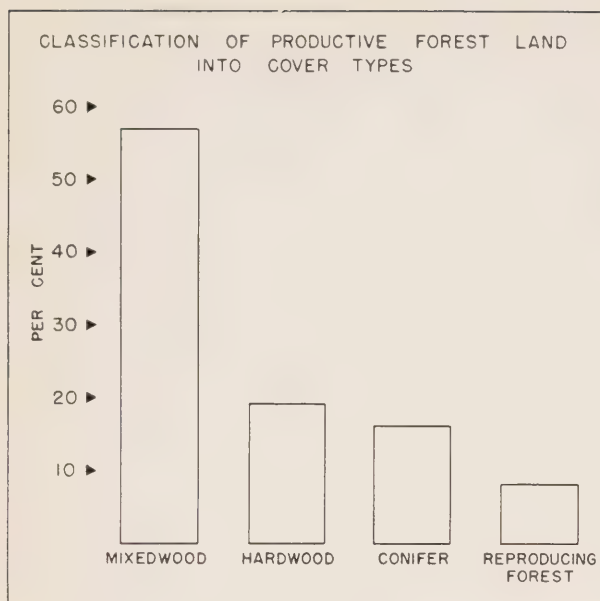


FIGURE 6

contains 75 per cent or more conifers or softwood trees, the hardwood type contains 75 per cent or more

hardwood or broadleaved trees, while all compositions varying between these two types are classified as mixedwoods. Areas which are too young to have a sufficiently stable composition to be classified into types, are referred to as reproducing forest.

Most of the forest area in this district is covered by the mixedwoods type, which occupies 57 per cent of the productive forest area. The hardwood type covers a lesser area, 19 per cent, and the coniferous type occupies the smallest portion, 16 per cent. Reproducing forests account for 8 per cent (fig. 6).

The distribution of cover types for Crown land is very similar to that of the total productive forest, varying by only two or three per cent. Patented lands, however, show a decided drop in the area of coniferous type which covers only 5 per cent of the productive forest area, and in the mixedwood type occupying only 41 per cent. There is a slight increase in the hardwood type to 24 per cent. The most noticeable change, however, occurs in the reproducing forest, which shows an increase to 30 per cent, compared to 8 per cent for the productive forest area as a whole.



*Logs are loaded on sleighs by means of jammers.*



## Volume

The volume of the primary growing stock includes all living trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Sudbury district is almost 4.5 billion cubic feet (4,472,925,000 cubic feet). This is an average of 1,249 cubic feet per acre (table 4).

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average total
	4''-9'' d.b.h.	10''+ d.b.h.	Average	4''-9'' d.b.h.	10''+ d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	972	1,343	2,315	599	2,006	2,605	2,320
Immature.....	880	452	1,332	895	511	1,406	1,338
Productive forest.....	738	579	1,317	397	287	684	1,249

The mature age class contains 1.8 billion cubic feet (table 5) or 2,320 cubic feet per acre, while the immature age class contains 2.7 billion cubic feet or 1,338 cubic feet per acre (fig. 7).

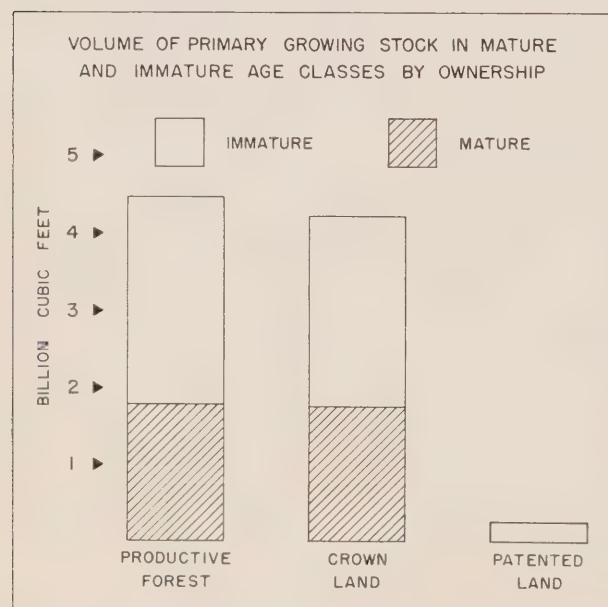


FIGURE 7

The volume of the primary growing stock on Crown lands in the Sudbury district is 4,213 million cubic feet (table 6) or an average of 1,317 cubic feet per acre. The mature age class contains 1,753 million cubic feet or 2,315 cubic feet per acre. These figures for Crown lands are very nearly the same as those for the productive forest as a whole due to the inappreciable amount of mature timber on patented lands. The immature age class on Crown lands contains 2,459 million cubic feet or 1,332 cubic feet per acre.

Patented lands in the Sudbury district have an area of 380,505 acres or 11 per cent of the total productive forest area. They contain a total of 260 million cubic feet or 684 cubic feet per acre (table 7). The mature age class, occupying 13,613 acres contains 35 million cubic feet or 2,605 cubic feet per acre. The immature age class contains 225 million cubic feet or 1,406 cubic feet per acre.

## Conifers vs. Hardwoods

The volume of the primary growing stock is about equally divided between the two species groups, conifers and hardwoods, with 2,292 million cubic feet or 51 per cent of the growing stock made up of conifers, and 2,181 million cubic feet or 49 per cent comprising the hardwood content (table 8). In the mature age class, conifers with 1,090 million cubic feet greatly exceed the hardwoods with 698 million cubic feet. In the immature age class, hardwoods with 1,483 million cubic feet exceed the conifers with 1,201 million cubic feet. Thus the softwood content of the forest, forming 45 per cent of the volume in the immature age class, has increased to 61 per cent in the mature age class.

The principal species on Crown lands making up the two groups, conifers and hardwoods, are shown in figure 8. Conifers consist of eight species—three pines, white, red and jack pine; two spruces, white and black; balsam-fir, hemlock and white cedar. The principal hardwoods consist of four species, two usually classed as tolerant hardwoods, maple and yellow birch, and two intolerant species groups, white birch and poplar. The name poplar applies to three main species, aspen, balsam poplar and large-toothed aspen.

Upon examination of the mature and immature age classes it is evident that there is no appreciable reduction of red and white pine in the growing stock in the immature age class. Together these two species have a growing stock of 662 million cubic feet, of which 336 million cubic feet are in the mature age



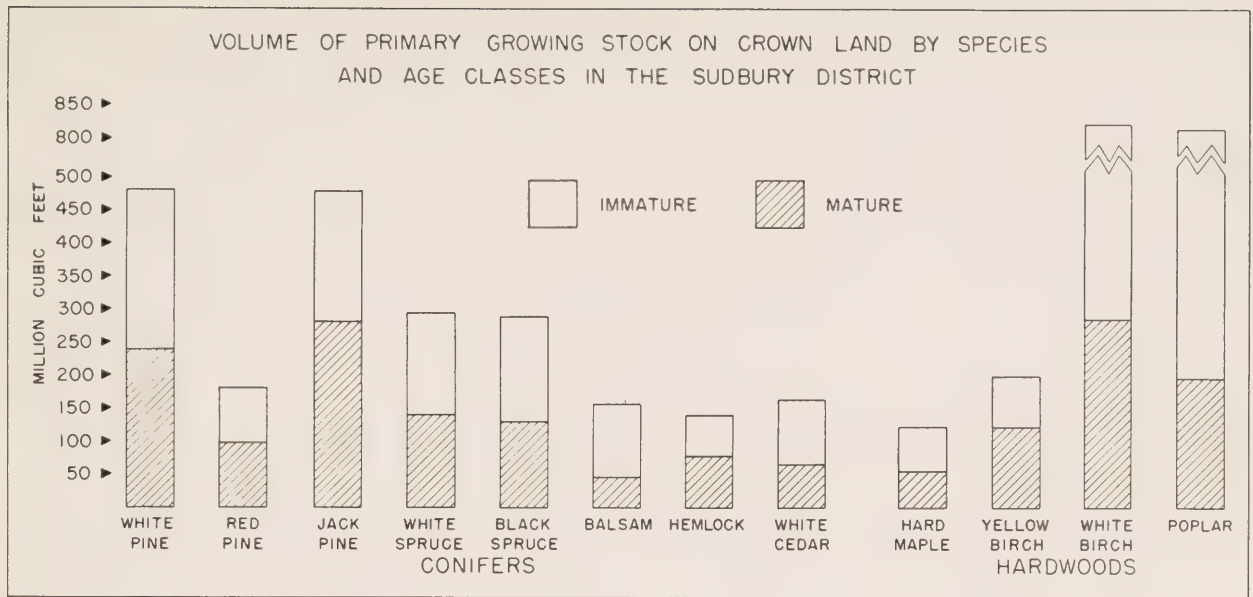


FIGURE 8

class and 326 million cubic feet are in the immature age class. In the mature age class they form 19 per cent of the mature growing stock, and in the immature age class 13 per cent. There is a large increase in poplar and white birch in the immature age class, whereas yellow birch has decreased from 7 per cent of the total growing stock in the mature age class to only 3 per cent in the immature class (fig. 8).

#### *Sawlogs vs. Pulpwood*

The volumes of the primary growing stock are shown in two size classes, one for trees from 4-9 inches d.b.h. and the other for trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as pulpwood and cordwood material depending on species, although poles, railway ties, and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for sawlogs, and other uses where larger timber is required. A tree 10 inches d.b.h. outside bark will on the average give one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition there is residual smaller size material in the top which may be used as pulpwood or for purposes other than saw timber. The quantity in this residual top is relatively small and is included in the 10 inches and over material in all inventory estimates. The practice of utilizing the tops of trees cut in sawlog operations for pulpwood, in the past has not been widespread. The use of former waste material of this kind is

increasing and a much larger proportion of the primary growing stock may be utilized in future operations.

Of the volume of the primary growing stock on productive forest lands, 2,513 million cubic feet are in the 4-9 inch d.b.h. size class, and 1,960 million cubic feet in the 10 inch d.b.h. class and over (table 8). For both species groups and for the productive forest area as a whole, the volume in the pulpwood and cordwood size class exceeds the volume in the sawlog size class.

In the mature age class the volume in the size class 10 inches d.b.h. and over amounting to 1,045 million cubic feet is 40 per cent greater than the volume in the 4-9 inch class with 744 million cubic feet. When the conifers and hardwoods are compared separately, the same relationship holds true, with the percentages being 34 and 52 respectively (table 8).

The immature age class presents an entirely different picture with almost twice the volume in the 4-9 inch d.b.h. class as compared with the volume in the 10 inch and over class.

The two size classes for Crown lands (table 9, fig. 9), show a marked consistency in the relationship between the volume in the two size classes and that of the area as a whole. Patented lands (table 10, fig. 10), show that in the mature age class, the 10 inch and over d.b.h. class contains over three times the volume of the 4-9 inch class. The size classes in the immature age class are similar to that for both Crown lands, and the area as a whole, with approximately

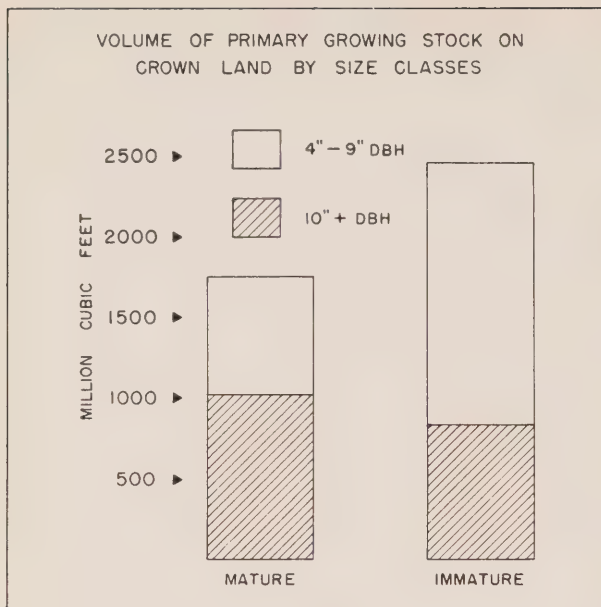


FIGURE 9

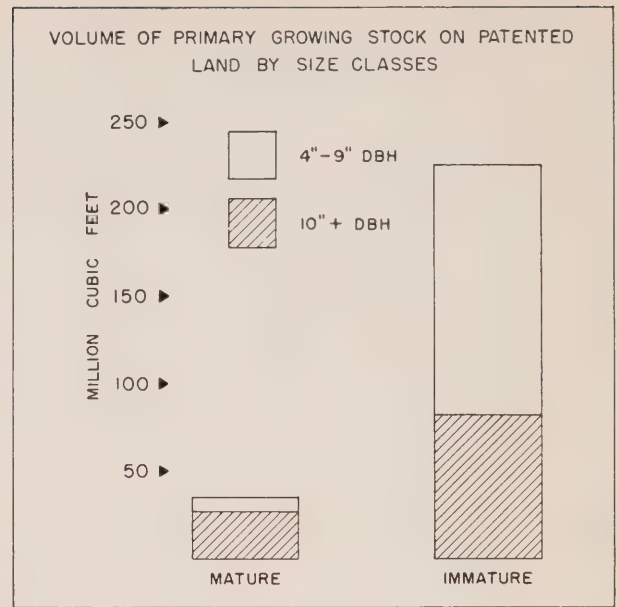


FIGURE 10

twice the volume in the 4-9 inch d.b.h. class as compared to the 10 inch and over class. However, the fairly consistent relationship between the two size classes as far as the total figures are concerned does not hold for the species when considered separately.

The volume relationship of the two size classes 4-9 inches d.b.h. and 10 inches and over for the principal species in mature and immature forest is shown in

figure 11 for conifers, and figure 12 for hardwoods which graphically represent table 9 for Crown lands. In the mature age class nearly all the red and white pine is in the larger size class, while in the immature age class just over half or 59 per cent is in the larger class. Jack pine has under one-half of its volume or 43 per cent in the 10 inch and over d.b.h. class in the mature age class, but just over one-quarter or 28 per

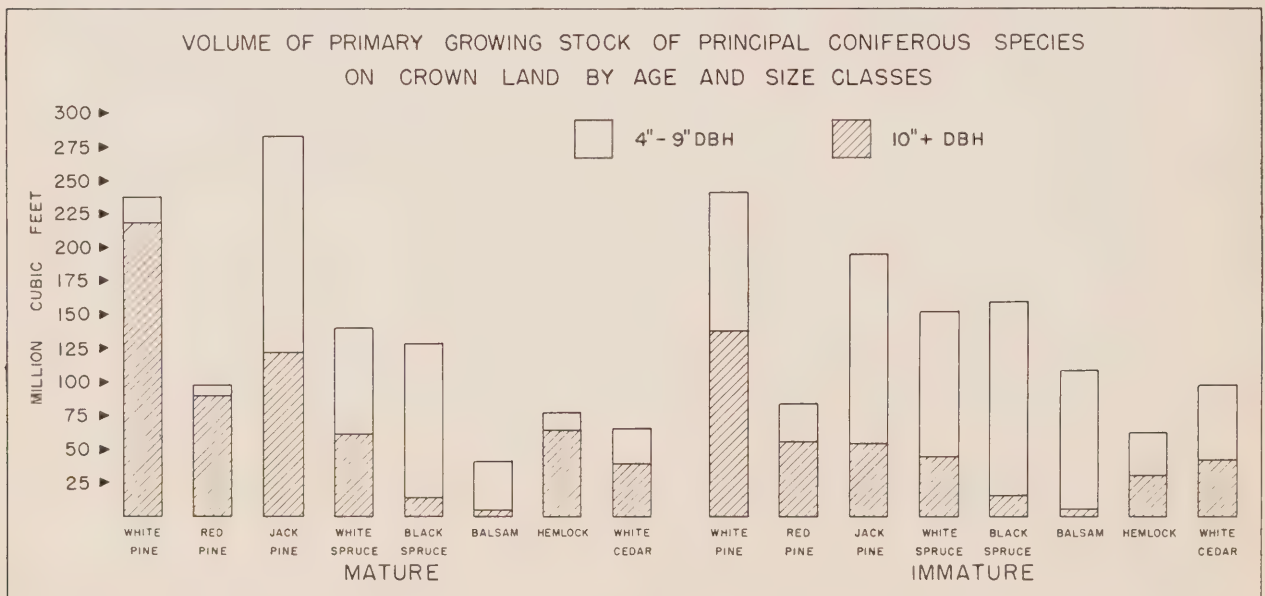


FIGURE 11

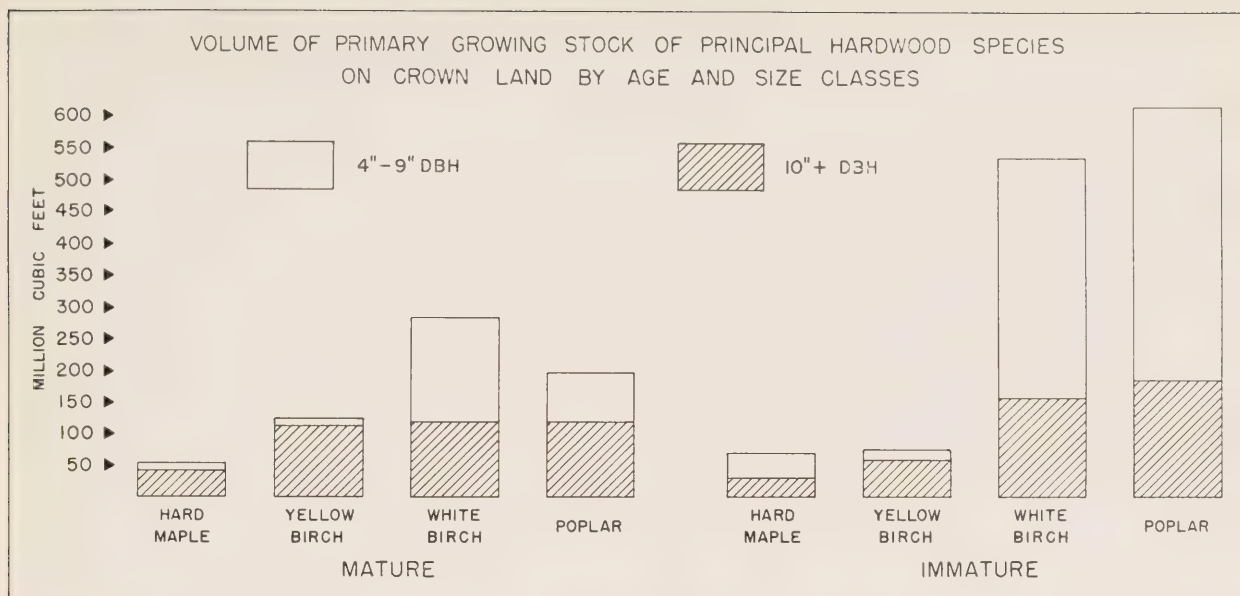


FIGURE 12

cent in the larger size class in the immature age. White spruce has under one-half or 44 per cent of its volume in the sawlog size in the mature forest and just under one-third or 30 per cent in the immature forest. Neither black spruce nor balsam fir show appreciable volumes in the sawlog size in either the mature or the immature age classes. Hemlock has over four-fifths or 83 per cent of its volume in the sawlog size in the mature forest, but less than one-half

or 48 per cent in the immature forest. White cedar has about one-half its volume in the sawlog size class in both mature and immature age classes.

The size relationships of the main hardwood species are shown in figure 12. The total volume of white birch in both age classes is slightly larger than that of poplar. White birch exceeds the poplar in the mature age class, but poplar exceeds white birch in the immature age class. In the mature forest 42 per cent

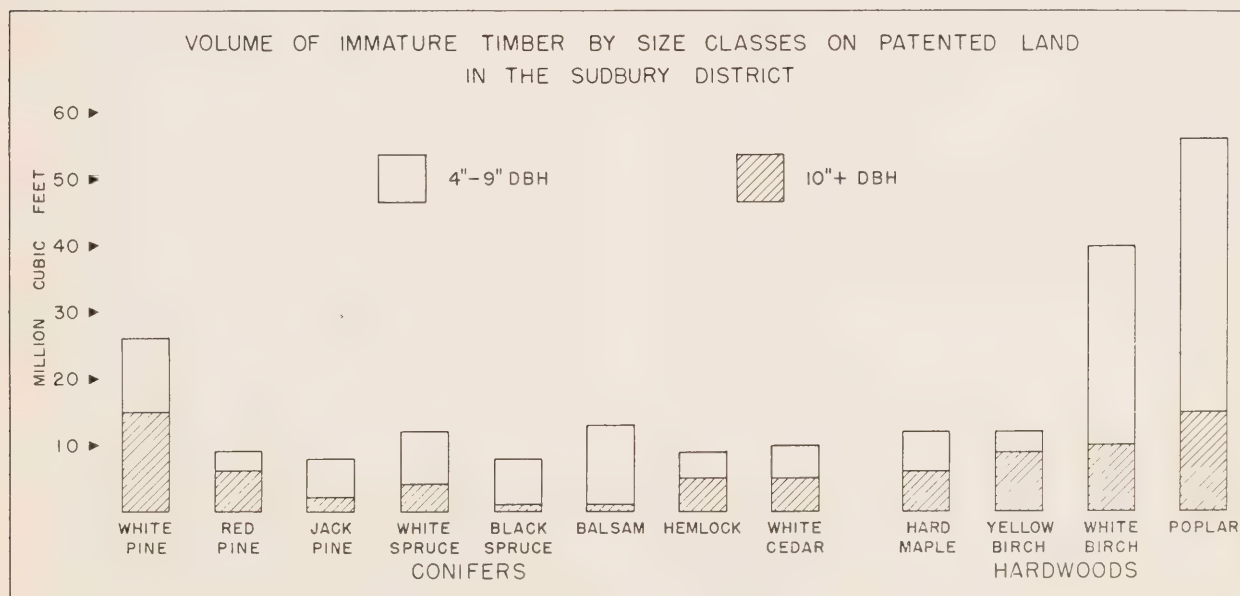


FIGURE 13



of the white birch is of sawlog size, while 61 per cent of the poplar is of sawlog size. In the immature age class less than one-third of both poplar and white birch is in the larger size class. Most of the yellow birch, in both mature and immature age classes, is in the 10 inch and over d.b.h. class. About three-quarters of the hard maple in the mature age class is in the larger size class, while about one-half in the immature forest is in this class.

The area of mature forest on patented lands is only 4 per cent of the total patented land area. Conifers form 42 per cent of the immature volume on patented lands and hardwoods form 58 per cent. The distribution of volume between the two size classes for conifers and hardwoods, by species, is shown in figure 13 which graphically represents table 10. Since these lands are readily accessible by roads they have been operated very intensively and even fuelwood in some sections is readily marketable. Unless the cut on patented lands is reduced and the timber permitted to grow to larger sizes these lands can produce very little sawlog material. With a market for the smaller size class readily available, these lands will certainly be operated on a short rotation producing much larger quantities of the small size class pulpwood, cordwood and other products.



*Log train en route to the "hot-pond."*

TABLE 5. — *Cubic foot volumes of primary growing stock on productive forest land (Crown plus patented land), in the Sudbury district by species groups, age classes, and cover type in two size classes.*

ALL SPECIES

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	202,888	334,607	288,153	104,180	929,828
Hardwood.....	26,225	62,196	376,719	161,058	626,198
Mixedwoods.....	515,045	647,798	1,103,858	650,198	2,916,899
TOTAL.....	744,158	1,044,601	1,768,730	915,436	4,472,925

ALL CONIFERS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	187,072	316,337	266,788	84,238	854,435
Hardwood.....	3,950	3,606	22,243	34,168	63,967
Mixedwoods.....	275,661	303,841	485,836	307,833	1,373,171
TOTAL.....	466,683	623,784	774,867	426,239	2,291,573

ALL HARDWOODS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	15,816	18,270	21,365	19,942	75,393
Hardwood.....	22,275	58,590	354,476	126,890	562,231
Mixedwoods.....	239,384	343,957	618,022	342,365	1,543,728
TOTAL.....	277,475	420,817	993,863	489,197	2,181,352

TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown lands in the Sudbury district by species groups, age classes and cover types in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	201,432	331,437	272,960	97,130	902,959
Hardwood.....	24,404	55,728	338,609	142,280	561,021
Mixedwoods.....	510,172	630,121	1,014,147	594,352	2,748,792
TOTAL.....	736,008	1,017,286	1,625,716	833,762	4,212,772

TABLE 7. — *Cubic-foot volumes of primary growing stock on patented lands in the Sudbury district by species groups, age classes and cover types in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,456	3,170	15,193	7,050	26,869
Hardwood.....	1,821	6,468	38,110	18,778	65,177
Mixedwoods.....	4,873	17,677	89,711	55,846	168,107
TOTAL.....	8,150	27,315	143,014	81,674	260,153

ALL CONIFERS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	185,752	313,435	252,924	78,546	830,657
Hardwood.....	3,815	3,245	20,401	28,844	56,305
Mixedwoods.....	273,280	296,903	445,588	280,876	1,296,647
TOTAL.....	462,847	613,583	718,913	388,266	2,183,609

ALL CONIFERS

Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,320	2,902	13,864	5,692	23,778
Hardwood.....	135	361	1,842	5,324	7,662
Mixedwoods.....	2,381	6,938	40,248	26,957	76,524
TOTAL.....	3,836	10,201	55,954	37,973	107,964

ALL HARDWOODS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	15,680	18,002	20,036	18,584	72,302
Hardwood.....	20,589	52,483	318,208	113,436	504,716
Mixedwoods.....	236,892	333,218	568,559	313,476	1,452,145
TOTAL.....	273,161	403,703	906,803	445,496	2,029,163

ALL HARDWOODS

Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	136	268	1,329	1,358	3,091
Hardwood.....	1,686	6,107	36,268	13,454	57,515
Mixedwoods.....	2,492	10,739	49,463	28,889	91,583
TOTAL.....	4,314	17,114	87,060	43,701	152,189



TABLE 8. — Cubic-foot volumes of primary growing stock on productive forest lands in the Sudbury district by species and age classes in two size classes.

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	19,162	221,894	115,286	152,593	508,935
Red pine.....	7,647	91,522	31,190	60,944	191,303
Jack pine.....	161,646	122,615	146,574	56,324	487,159
White spruce.....	79,393	61,694	116,517	50,001	307,605
Black spruce.....	116,046	14,030	150,363	17,133	297,572
Balsam fir.....	41,912	5,233	115,018	6,206	168,369
Hemlock.....	13,998	66,377	36,227	34,947	151,549
White cedar.....	26,869	40,414	59,960	47,932	175,175
Larch.....	10	5	3,732	159	3,906
TOTAL CONIFERS.....	466,683	623,784	774,867	426,239	2,291,573
Hard maple.....	14,436	45,880	44,094	36,548	140,958
Yellow birch.....	10,804	120,530	19,473	67,001	217,808
Other tolerants.....	379		747		1,126
Beech.....			542	405	947
White elm.....	108	1,021	491	666	2,286
Ironwood.....	809	97	2,480	278	3,664
Red oak.....	40	302	9,065	3,318	12,725
White birch.....	165,900	123,369	410,069	166,588	865,926
Poplar (all).....	78,508	121,556	473,025	200,011	873,100
Red maple.....	2,379	2,240	21,835	5,855	32,309
Ash.....	3,786	3,508	11,838	8,205	27,337
Basswood.....	326	2,314	204	322	3,166
TOTAL HARDWOODS.....	277,475	420,817	993,863	489,197	2,181,352
TOTAL ALL SPECIES	744,158	1,044,601	1,768,730	915,436	4,472,925

TABLE 9. — Cubic-foot volumes of primary growing stock on Crown lands in the Sudbury district by species and age classes in two size classes.

Species	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	19,041	219,391	104,411	137,519	480,362
Red pine.....	7,572	90,092	28,535	55,053	181,252
Jack pine.....	161,088	121,997	140,378	54,234	477,697
White spruce.....	78,994	60,732	108,564	45,931	294,221
Black spruce.....	115,513	13,845	143,720	16,203	289,281
Balsam fir.....	41,007	4,997	103,219	5,347	154,570
Hemlock.....	13,500	63,868	31,715	30,365	139,448
White cedar.....	26,123	38,656	54,816	43,468	163,063
Larch.....	9	5	3,555	146	3,715
TOTAL CONIFERS.....	462,847	613,583	718,913	388,266	2,183,609
Hard maple.....	13,250	41,535	37,922	30,406	123,113
Yellow birch.....	10,284	113,074	17,029	57,772	198,159
Other tolerants.....	379		747		1,126
Beech.....			460	343	803
White elm.....	93	900	386	524	1,903
Ironwood.....	749	87	2,110	237	3,183
Red oak.....	31	239	7,504	2,644	10,418
White birch.....	164,720	120,511	380,174	156,197	821,602
Poplar (all).....	77,493	119,743	431,705	185,279	814,220
Red maple.....	2,236	2,088	18,340	4,734	27,398
Ash.....	3,619	3,326	10,253	7,087	24,285
Basswood.....	307	2,200	173	273	2,953
TOTAL HARDWOODS.....	273,161	403,703	906,803	445,496	2,029,163
TOTAL ALL SPECIES	736,008	1,017,286	1,625,716	833,762	4,212,772



A typical "hot-pond."



TABLE 10.— *Cubic-foot volumes of primary growing stock on patented lands in the Sudbury district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented lands
	4'-9" d.b.h.	10' up d.b.h.	4'-9" d.b.h.	10' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	121	2,503	10,875	15,074	28,573
Red pine.....	75	1,430	2,655	5,891	10,051
Jack pine.....	558	618	6,196	2,090	9,462
White spruce.....	399	962	7,953	4,070	13,384
Black spruce.....	533	185	6,643	930	8,291
Balsam fir.....	905	236	11,799	859	13,799
Hemlock.....	498	2,509	4,512	4,582	12,101
White cedar.....	746	1,758	5,144	4,464	12,112
Larch.....	1	.....	177	13	191
<b>TOTAL CONIFERS.....</b>	<b>3,836</b>	<b>10,201</b>	<b>55,954</b>	<b>37,973</b>	<b>107,964</b>
Hard maple.....	1,186	4,345	6,172	6,142	17,845
Yellow birch.....	520	7,456	2,444	9,229	19,649
Other tolerants.....	.....	.....	.....	.....	.....
Beech.....	.....	.....	82	62	144
White elm.....	15	121	105	142	383
Ironwood.....	60	10	370	41	481
Red oak.....	9	63	1,561	674	2,307
White birch.....	1,180	2,858	29,895	10,391	44,324
Poplar (all).....	1,015	1,813	41,320	14,732	58,880
Red maple.....	143	152	3,495	1,121	4,911
Ash.....	167	182	1,585	1,118	3,052
Basswood.....	19	114	31	49	213
<b>TOTAL HARDWOODS.....</b>	<b>4,314</b>	<b>17,114</b>	<b>87,060</b>	<b>43,701</b>	<b>152,189</b>
<b>TOTAL ALL SPECIES</b>	<b>8,150</b>	<b>27,315</b>	<b>143,014</b>	<b>81,674</b>	<b>260,153</b>

### *Allowable Cut*

The allowable cut has been computed for each species with the aid of a volumetric formula<sup>1</sup> and appropriate rotation<sup>2</sup> for species. Thus the amount of the allowable cut results from the volume of the primary growing stock and rotation adopted for each species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may appear on areas which, at the moment, are inaccessible to operations or which are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential, rather than actually available under present operating conditions.

<sup>1</sup> Methods of calculation of allowable cut are given in appendix, methods, allowable cut, page 28.

<sup>2</sup> Rotation by species, table 16, page 28.

The calculation of the allowable cut, based on the present volume of the primary growing stock, is of value for a period of about ten years. This is because of woods operations being carried out as well as the present stands growing in volume, each year. Therefore, the size and structure of the primary growing stock, regarded as the foundation of the allowable cut calculations, change also from year to year and for that reason, on expiration of the initial ten year period the allowable cut should be calculated anew. With effective forestry practices allowable cuts for the valuable species will tend to increase; without improved forestry practices the present trend to more and more poplar and white birch at the expense of pines and spruces may continue.

Patented lands in the district contain very little mature timber. These lands are for the most part readily accessible by roads and have a local market for small size material. They are now operated on a short rotation and are producing very little sawlog size material. This condition has been taken into consideration and the allowable cut for patented land has been calculated on a shorter rotation than for Crown lands in the district.

The annual allowable cut, or net depletion allowable under management in the Sudbury district is 66,905,075 cubic feet, 58,084,770 cubic feet from



*Manufacturing skis at Sudbury.*

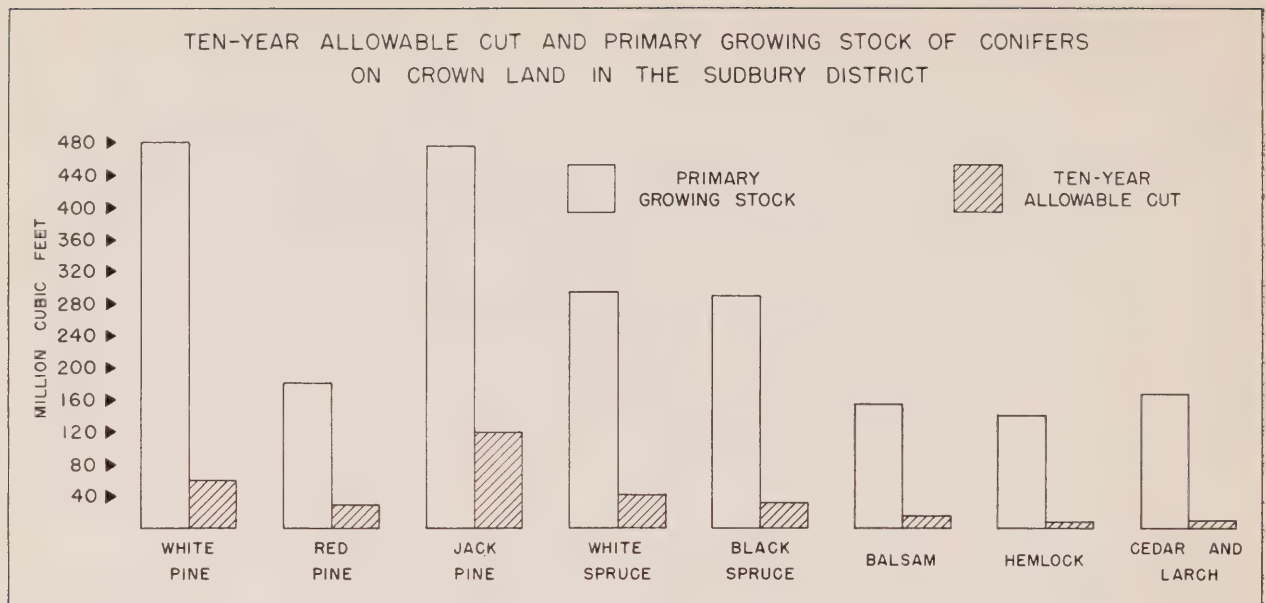


FIGURE 14

Crown lands and 8,820,305 cubic feet from patented lands. Of the total allowable cut, 87 per cent is on Crown lands and 13 per cent on patented lands.

#### CROWN LAND

The annual allowable cut for Crown lands represents 1.4 per cent of the primary growing stock or 18.2 cubic feet per acre of the productive forest area. Of the total allowable cut 31,727,875 cubic feet or 55 per cent is coniferous species and 26,356,895 cubic feet or 45 per cent is of hardwood species. The annual allowable cut for conifers is 1.5 per cent of their primary growing stock and 1.3 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 28 per

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Sudbury district.*

Species	Annual allowable cut cu. ft.
White pine.....	5,960,805
Red pine.....	2,929,905
Jack pine.....	12,132,200
White spruce.....	4,191,755
Black spruce.....	3,233,940
Balsam fir.....	1,533,470
Hemlock.....	773,685
White cedar.....	971,690
Larch.....	425
<b>TOTAL CONIFERS.....</b>	<b>31,727,875</b>

cent is white and red pine, 38 per cent jack pine, 23 per cent white and black spruce, 5 per cent balsam fir and 6 per cent other conifers. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock by species is shown graphically, figure 14.

The species making up the hardwood content (table 12) shows that 45 per cent is poplar and another

TABLE 12. — *Annual allowable cut for hardwood species on Crown lands.*

Species	Annual allowable cut cu. ft.
Hard maple.....	821,770
Yellow birch.....	2,467,165
White elm.....	19,865
Ironwood.....	25,075
Red oak.....	4,045
White birch.....	10,696,155
Poplar.....	11,834,190
Red maple.....	185,330
Ash, white and black.....	208,365
Basswood.....	83,575
Other hardwoods.....	11,360
<b>TOTAL HARDWOODS.....</b>	<b>26,356,895</b>

41 per cent is white birch. This indicates that only 14 per cent of the allowable cut is left for other hardwood species of which yellow birch is the most important. The relationship of the allowable cut for a ten year period to the volume of the primary growing stock for hardwood species is shown graphically, figure 15.

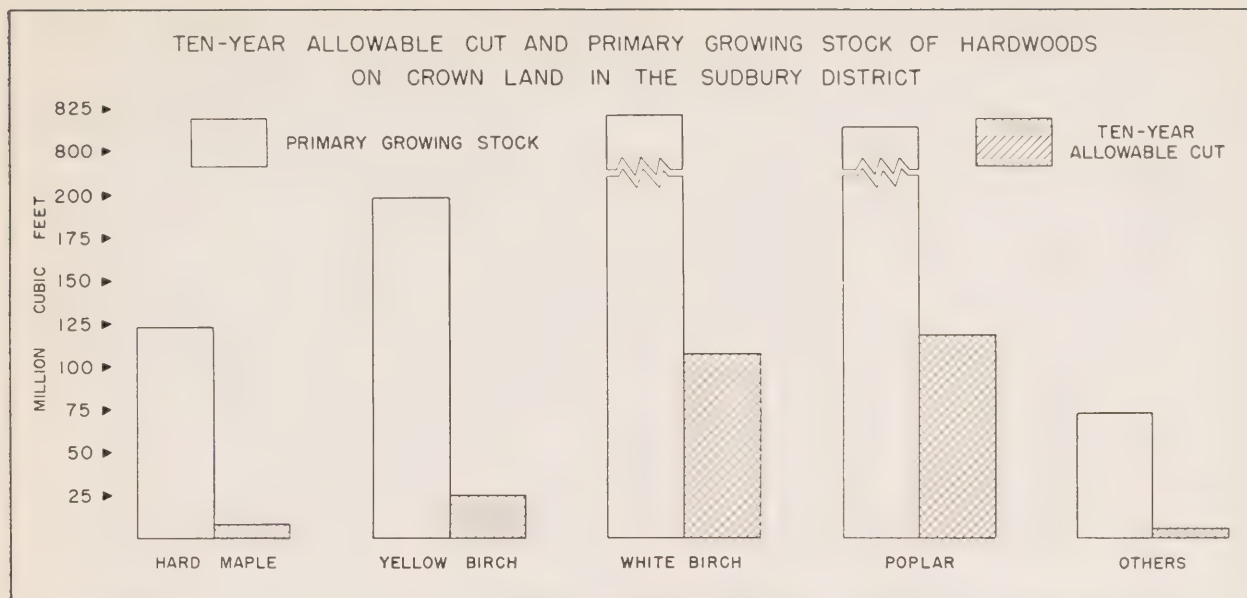


FIGURE 15



*Stacking lumber in drying yard.*



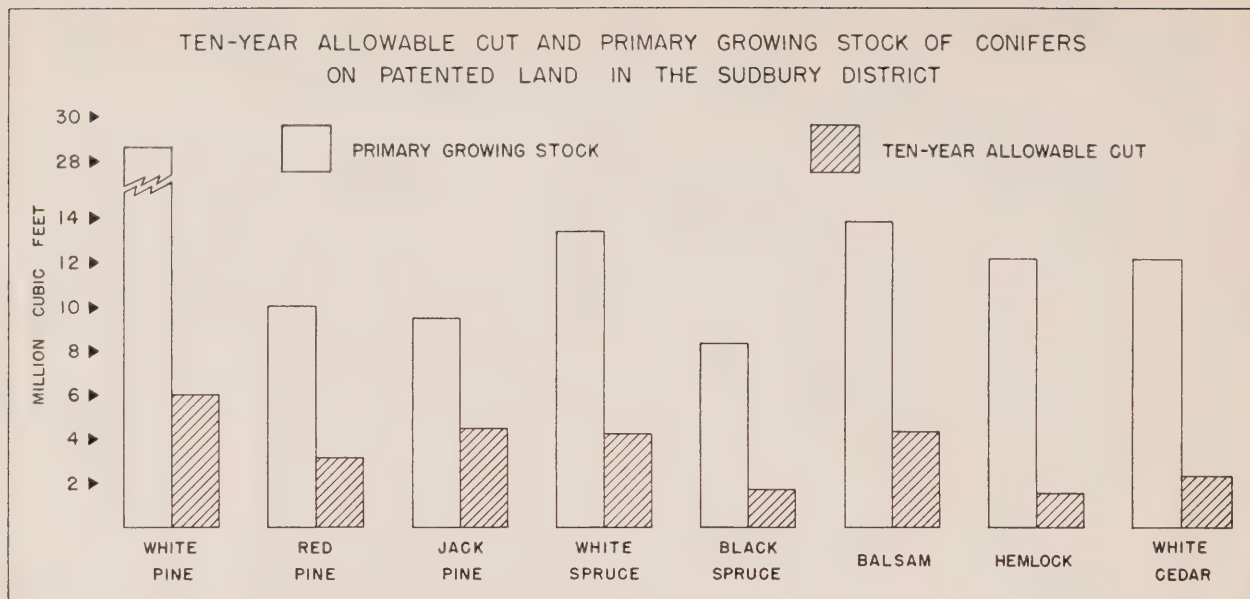


FIGURE 16

#### PATENTED LANDS

The annual allowable cut for patented lands amounts to 8,820,305 cubic feet, which represents 3.4 per cent of the primary growing stock or 23.2 cubic feet per acre of the productive forest land. The annual allowable cut is 2.6 per cent of the primary growing stock for conifers and 4.0 per cent for hardwoods. The justification for cutting annually four per cent of the primary growing stock of hardwoods is to be found in the very short rotation of thirty years on

which it is proposed to manage the large areas of poplar stands.

The annual allowable cut for coniferous species on patented lands is 2,758,225 cubic feet and for hardwoods 6,062,080 cubic feet. Over one-half of the allowable cut is for the two intolerant hardwood species, poplar and white birch, which together contribute 5,065,130 cubic feet to the total allowable cut. For the coniferous species, white pine is the most important, contributing about 600 thousand cubic

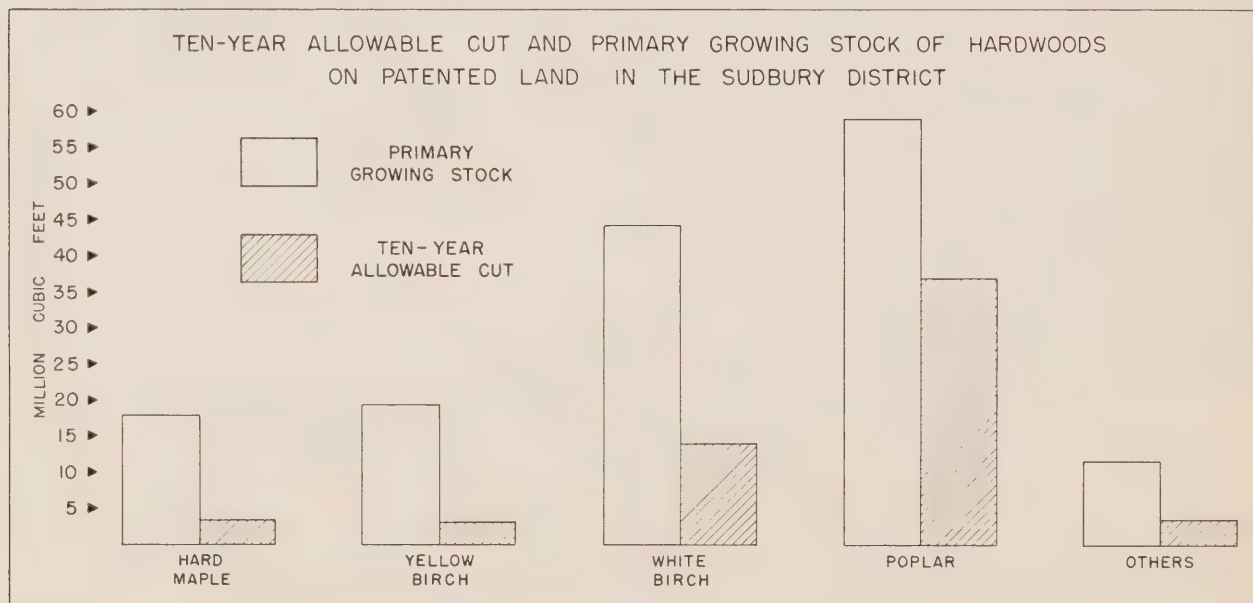


FIGURE 17

ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT OF CONIFERS  
BY SPECIES ON CROWN LAND IN THE SUDBURY DISTRICT

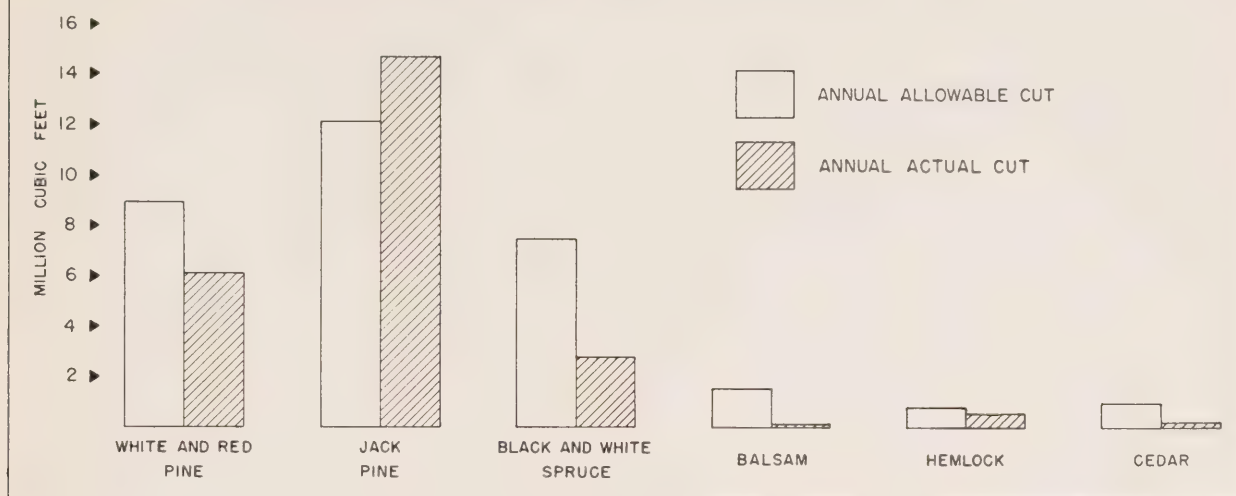


FIGURE 18

TABLE 13. — Annual allowable cut for all species  
on patented lands.

Species	Annual allowable cut cu. ft.
White pine.....	595,280
Red pine.....	314,105
Jack pine.....	443,515
White spruce.....	418,240
Black spruce.....	172,730
Balsam fir.....	431,220
Hemlock.....	151,260
White cedar.....	227,110
Larch.....	4,765
<b>TOTAL CONIFERS.....</b>	<b>2,758,225</b>
Hard maple.....	334,585
Yellow birch.....	307,015
Beech.....	1,795
White elm.....	7,180
Ironwood.....	9,020
Red oak.....	43,245
White birch.....	1,385,140
Poplar.....	3,679,990
Red maple.....	230,220
Ash, white and black.....	57,230
Basswood.....	6,660
<b>TOTAL HARDWOODS.....</b>	<b>6,062,080</b>

Utilization vs. Allowable Cut

According to the Classification of Annual Timber Returns for the years ending March 31, 1946-1949<sup>1</sup>, inclusive, the following average-annual amounts of wood and forest products were cut on Crown lands in the Sudbury district:

Logs and booms.....	22,056,396 F.B.M. Doyle rule
Pulpwood.....	79,993 cords
Pit props.....	621 cords
Fuelwood.....	5,442 cords
Poles.....	91,864 cubic feet
Piling.....	1,312 cubic feet
Poles.....	7,514 pieces
Piling.....	13,944 pieces
Posts.....	24,082 pieces
Lagging.....	5,918 pieces
Car stakes.....	6,097 pieces
Ties.....	8,506 pieces

feet to the total allowable cut. Jack pine, white spruce and balsam fir are next in importance with approximately 400 thousand cubic feet each. These species are followed by the red pine, cedar, black spruce and others (figs. 16 and 17).



<sup>1</sup> Reports of the Minister of Lands and Forests for the Province of Ontario for the fiscal years ending March 31, 1947-1950.

By the use of appropriate converting factors these amounts are expressed in gross total cubic feet and are comparable with the figures for allowable cut (table 14).

TABLE 14. — Gross total cubic volume of wood utilized annually in the Sudbury district.

Species	Wood utilized cu. ft.	Total per cent
Pine, white and red.....	6,102,874	22.0
Jack pine.....	14,673,689	52.9
Spruce, white and black.....	2,749,279	9.9
Balsam fir.....	88,125	.3
Hemlock.....	536,278	1.9
Cedar.....	152,720	.5
Larch.....	226	.....
<b>TOTAL CONIFERS.....</b>	<b>24,303,191</b>	<b>87.5</b>
Hard maple.....	148,294	.5
Birch, yellow and white.....	446,518	1.6
Poplar.....	2,792,546	10.1
Other hardwoods.....	71,611	.3
<b>TOTAL HARDWOODS.....</b>	<b>3,458,969</b>	<b>12.5</b>
<b>TOTAL.....</b>	<b>27,762,160</b>	

A comparison of the annual allowable cut with the actual cut by species (table 15) indicates that only jack pine was cut about 20 per cent more than permitted under sustained yield regulations. The utilization of other conifers was less than the allowable cut (fig. 18).

The hardwood species were sparingly used in the Sudbury district with only 3,459 thousand cubic feet

TABLE 15. — Comparison of allowable cut with actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red.....	8,891	6,103
Jack pine.....	12,132	14,674
Spruce, white and black.....	7,426	2,749
Balsam fir.....	1,534	88
Hemlock.....	774	536
Cedar.....	971	153
<b>TOTAL CONIFERS.....</b>	<b>31,728</b>	<b>24,303</b>
Hard maple.....	822	148
Birch, yellow and white.....	13,163	446
Poplar.....	11,834	2,793
Other hardwoods.....	538	72
<b>TOTAL HARDWOODS.....</b>	<b>26,357</b>	<b>3,459</b>
<b>TOTAL.....</b>	<b>58,085</b>	<b>27,762</b>

utilized out of a total allowable cut of 26,357 thousand cubic feet (table 15). While the cut of conifers was 77 per cent of the allowable cut, only 13 per cent of the allowable cut for hardwood species was utilized. Excessive volumes of poplar and white birch remain unutilized on Crown lands in the Sudbury district (fig. 19).

There are no available records of the quantity of timber utilized from patented lands in the Sudbury district, but the condition of the growing stock on these lands indicates extensive overcutting of the main merchantable species.

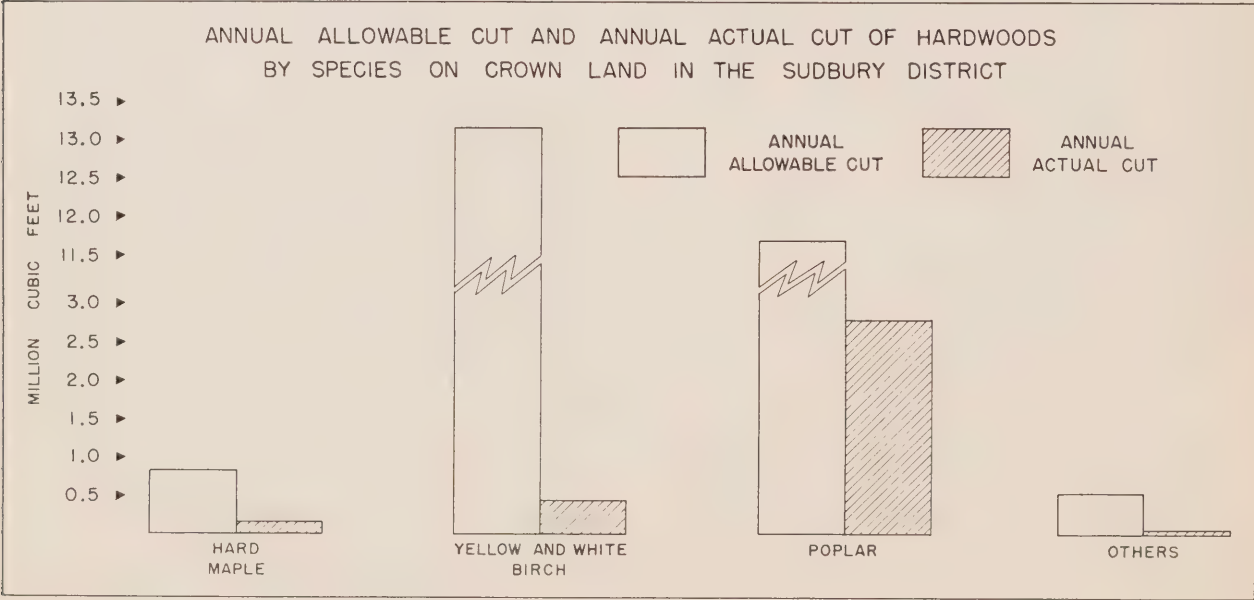


FIGURE 19



# APPENDIX

## *Survey Methods*

● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15,840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Field sampling was carried out during the summers of 1947, 1948 and 1951 by crews who collected all the data necessary for the making of the volume estimates. On the completion of the field work, finished forest type maps were prepared and areas determined by the usual methods.<sup>1</sup>

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for the four ecological sections in the Sudbury district. The per acre volumes in cubic feet, made up in this manner, are shown in tables 18, 19, 20.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the Sudbury district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Sudbury district are shown in figure 20.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

<sup>1</sup> A complete statement of the methods used in the forest resources inventory is contained in Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

<sup>2</sup> Manual of Timber Management, Dept. of Lands and Forests, Ontario — Part II, page 50.

The mean annual increment to the rotation age for Crown lands amounts to 26 cubic feet per acre, and for patented land, 35 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

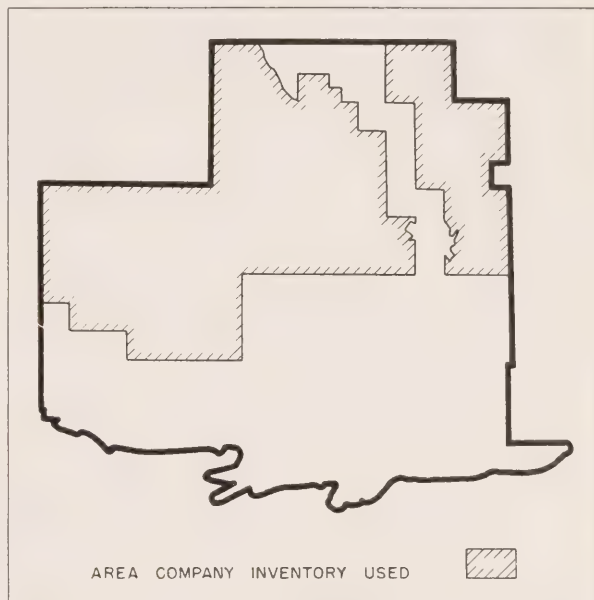


FIGURE 20

## *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range from 10 to 150 years, the mature age class from 30 to 300 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

## *Rotation*

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class 1b<sup>2</sup> were used as rotation ages for each species encountered except jack pine where a rotation of 70 years has been accepted as more suitable than that of 60 years. In addition, the rotation age of one hundred years has been adopted arbitrarily for the miscellaneous hardwood species (table 16).

Since future requirements of wood from patented lands will have to be met by utilizing areas in the

present immature age class, a lower rotation age has been adopted for patented land than for Crown land.

TABLE 16. — *Rotation ages by species.*

Species	Crown land	Patented land
	years	years
White pine.....	120	90
Red pine.....	100	60
Jack pine.....	70	40
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
Hemlock.....	300	150
White cedar.....	200	100
Larch.....	100	75
Hard maple.....	200	100
Yellow birch.....	150	120
Other tolerants.....	100	.....
White elm.....	150	100
Ironwood.....	100	100
Red oak.....	200	100
White birch.....	80	60
Poplar (all).....	50	30
Red maple.....	70	40
White and black ash.....	100	100
Basswood.....	90	60

### Allowable Cut

#### (a) METHOD

The following two bases were available for calculation of allowable cut: (1) the volumes of the mature and immature age classes for each species, and (2) the adopted rotation ages.

The compilation was carried out in such a way that the volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory, for the following reasons: 1. The ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 required by the French method. 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. 3. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

<sup>1</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.

#### (b) FORMULA

In the present calculations the following formulae were used:

$$(1) \text{ Crown land — } P = \frac{V.1.}{n/3}$$

$$(2) \text{ Patented land — } P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

V.1. — denotes volume of mature timber (Age Class I)

V.2. — denotes volume of immature timber (Age Class II)

n — denotes rotation

P — denotes annual allowable cut

The choice of the formula for Crown land was based upon the assumption that only mature timber is to be utilized, and that the present mature stock should last for one-third of the rotation.

The choice of the formula for patented land was made in view of the fact that the mature timber practically does not exist, and that the immature timber would have to be cut in order to meet the considerable needs of wood in the densely populated area.

The allowable cut has been calculated for each species, separately, with full consideration of the actual growing stock of each species and the proper rotation. Thus all uncertain assumptions, such as an average rotation for all species, or on species content of the allowable cut calculated in one figure only for the whole district, have been eliminated.

The results of individual calculations for each species have been totalled and shown as allowable cut for Crown and patented land, respectively.

TABLE 17. — *Cull factors by species, Sudbury district.*

Species	Cull per cent
White pine.....	30
Red pine.....	30
Jack pine.....	35
White spruce.....	20
Black spruce.....	20
Balsam fir.....	40
Hemlock.....	50
White cedar.....	60
Larch.....	20
Hard maple.....	35
Yellow birch.....	35
White elm.....	35
Red oak.....	80
White birch.....	35
Poplar (all).....	30
White and black ash.....	30
Basswood .....	30



### Cull Factor

Where it was necessary in the course of the inventory to determine the volume of the primary growing stock where company reports gave only merchantable

volumes or for the calculation of merchantable volumes from primary growing stock, cull factors (table 17) were used. These cull factors were made available from operations in the district.

### Common and Botanical Names of Tree Species included in Timber Estimates

#### CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill.) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
Hemlock.....	<i>Tsuga canadensis</i> (L.) Carr.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

#### HARDWOODS

Hard maple.....	<i>Acer saccharum</i> Marsh.
Yellow birch.....	<i>Betula lutea</i> Michx. f.
Beech.....	<i>Fagus grandifolia</i> Erhr.
White elm.....	<i>Ulmus americana</i> L.
Ironwood.....	<i>Ostrya virginiana</i> (Mill.) K. Koch.
Red oak.....	<i>Quercus borealis</i> Michx. f.
Red maple.....	<i>Acer rubrum</i> L.
White ash.....	<i>Fraxinus americana</i> L.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
Basswood.....	<i>Tilia glabra</i> Vent.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.



After working hours — the sociableness of music.



TABLE 18. — Volume of the primary growing stock in cubic feet per acre.

Algonquin Section — 1947-'48

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	23.1	22.6	19.8	.....	224.0	211.1	163.9	.....
	10'' up	307.0	300.8	262.7	267.8	242.6	228.7	177.5	.....
Red pine.....	4''-9''	.....	.....	.....	.....	139.0	131.0	101.7	.....
	10'' up	.....	.....	.....	.....	104.8	98.9	76.7	.....
Jack pine.....	4''-9''	.....	.....	.....	141.9	109.8	103.5	80.3	70.1
	10'' up	.....	.....	.....	19.3	15.0	14.1	11.0	46.8
White spruce.....	4''-9''	19.1	18.7	16.4	.....	94.0	88.7	68.9	55.3
	10'' up	93.4	91.5	79.9	.....	42.3	39.8	30.9	.....
Black spruce.....	4''-9''	117.5	115.1	100.6	42.1	143.6	135.3	105.1	254.1
	10'' up	17.6	17.2	15.0	103.0	19.6	18.5	14.3	.....
Balsam fir.....	4''-9''	76.1	74.6	65.2	59.5	82.1	77.5	60.1	24.5
	10'' up	11.4	11.1	9.7	.....	6.2	5.8	4.5	.....
Hemlock.....	4''-9''	181.1	177.3	154.9	.....	142.6	134.4	104.3	.....
	10'' up	771.8	756.1	660.5	.....	116.6	110.0	85.4	.....
White cedar.....	4''-9''	74.1	72.6	63.4	266.2	104.8	98.8	76.7	136.5
	10'' up	316.1	309.6	270.4	98.4	69.9	65.9	51.2	.....
TOTAL CONIFERS.....	4''-9''	491.0	480.9	420.3	509.7	1039.9	980.3	761.0	540.5
	10'' up	1517.3	1486.3	1298.2	488.5	617.0	581.7	451.5	46.8
Hard maple.....	4''-9''	2.8	2.8	2.4	.....	.....	.....	.....	34.3
	10'' up	12.2	11.9	10.4	.....	.....	.....	.....	.....
Yellow birch.....	4''-9''	18.2	17.8	15.6	8.7	6.5	6.2	4.8	.....
	10'' up	209.4	205.2	179.1	.....	31.9	30.6	23.3	.....
White birch.....	4''-9''	38.7	37.9	33.1	51.3	61.3	57.8	44.8	37.8
	10'' up	176.4	172.8	150.9	181.8	50.1	47.2	36.7	.....
Poplar (all).....	4''-9''	5.4	5.3	4.6	.....	55.0	51.8	40.2	40.6
	10'' up	12.1	11.9	10.4	.....	46.8	44.1	34.3	.....
Red maple.....	4''-9''	12.4	12.2	10.6	.....	10.9	10.4	8.0	.....
	10'' up	5.1	5.0	4.4	.....	0.6	0.5	0.4	.....
TOTAL HARDWOODS.....	4''-9''	77.5	76.0	66.3	60.0	133.7	126.2	97.8	112.7
	10'' up	415.2	406.8	355.2	181.8	129.4	121.8	94.7	.....
GRAND TOTAL.....	4''-9''	568.5	556.9	486.6	569.7	1173.6	1106.5	858.8	653.2
	10'' up	1932.5	1893.1	1653.4	670.3	746.4	703.5	546.2	46.8
TOTAL 4'' UP.....		2501.0	2450.0	2140.0	1240.0	1920.0	1810.0	1405.0	700.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	.....	.....	.....	.....	7.4	6.9	5.2	.....
	10'' up	.....	.....	.....	.....	18.1	16.8	12.8	.....
White spruce.....	4''-9''	3.1	2.7	2.1	.....	10.0	9.3	7.1	.....
	10'' up	13.9	12.4	9.8	.....	10.4	9.7	7.3	.....
Balsam fir.....	4''-9''	17.7	15.7	12.4	7.8	23.2	21.6	16.4	3.4
	10'' up	2.7	2.4	1.9	11.8	2.3	2.1	1.6	5.2
Hemlock.....	4''-9''	23.7	21.0	16.6	.....	7.3	6.8	5.2	.....
	10'' up	74.9	66.4	52.4	.....	13.1	12.2	9.2	.....
White cedar.....	4''-9''	12.4	11.0	8.7	1.2	7.0	6.5	4.9	0.5
	10'' up	11.4	10.1	8.0	58.6	10.0	9.3	7.1	25.8
TOTAL CONIFERS.....	4''-9''	56.9	50.4	39.8	9.0	54.9	51.1	38.8	3.9
	10'' up	102.9	91.3	72.1	70.4	53.9	50.1	38.0	31.0
Hard maple.....	4''-9''	269.3	238.8	188.5	225.3	107.9	100.5	76.2	99.0
	10'' up	1413.7	1253.6	989.5	49.5	126.7	118.0	89.4	21.7
Yellow birch.....	4''-9''	64.0	56.8	44.8	68.4	33.3	31.0	23.5	30.0
	10'' up	850.6	754.2	595.4	68.4	85.7	79.8	60.5	30.1
Beech.....	4''-9''	.....	.....	.....	.....	8.7	8.1	6.2	.....
	10'' up	.....	.....	.....	.....	6.6	6.1	4.6	.....
White elm.....	4''-9''	8.3	7.3	5.8	.....	.....	.....	.....	.....
	10'' up	83.5	74.1	58.5	.....	.....	.....	.....	.....
Hornbeam.....	4''-9''	22.6	20.0	15.8	.....	17.8	16.5	12.5	.....
	10'' up	4.6	4.1	3.2	.....	0.9	0.9	0.7	.....

TABLE 18 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>	1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>
Red oak.....	4''-9'' 10'' up	2.2 18.2	2.0 16.1	1.6 12.7	.....	24.9 7.4	23.2 6.9	17.6 5.2	.....
White birch.....	4''-9'' 10'' up	49.0 104.0	43.4 92.3	34.3 72.8	138.0	352.1 18.5	327.8 17.3	248.5 13.1	60.6
Poplar (all).....	4''-9'' 10'' up	68.2 132.4	60.5 117.4	47.7 92.7	377.7 46.7	546.6 145.3	509.1 135.3	385.8 102.6	165.8 20.5
Red maple.....	4''-9'' 10'' up	10.7 6.3	9.5 5.6	7.5 4.4	32.5 35.3	35.8 8.4	33.4 7.8	25.3 5.9	14.3 15.5
Black ash.....	4''-9'' 10'' up	28.5 63.3	25.2 56.2	19.9 44.4	28.8	30.3 25.8	28.2 24.0	21.4 18.2	12.6
Basswood.....	4''-9'' 10'' up	7.8 33.0	6.9 29.3	5.4 23.2	.....	3.3 5.2	3.1 4.8	2.3 3.7	.....
TOTAL HARDWOODS.....	4''-9'' 10'' up	530.6 2709.6	470.4 2402.9	371.3 1896.8	870.7 199.9	1160.7 430.5	1080.9 400.9	819.3 303.9	382.3 87.8
GRAND TOTAL.....	4''-9'' 10'' up	587.5 2812.5	520.8 2494.2	411.1 1968.9	879.7 270.3	1215.6 484.4	1132.0 451.0	858.1 341.9	386.2 118.8
TOTAL 4'' UP.....		3400.0	3015.0	2380.0	1150.0	1700.0	1583.0	1200.0	505.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>	1 <i>cu. ft.</i>	2 <i>cu. ft.</i>	3 <i>cu. ft.</i>	4 <i>cu. ft.</i>
White pine.....	4''-9'' 10'' up	7.4 74.6	7.0 71.0	5.8 59.1	.....	149.8 64.2	141.3 60.6	116.8 50.1	97.1 158.4
Red pine.....	4''-9'' 10'' up	1.8 7.7	1.7 7.3	1.4 6.1	.....	35.5 14.5	33.5 13.7	27.7 11.3	.....
White spruce.....	4''-9'' 10'' up	29.2 87.5	27.8 83.2	23.1 69.2	.....	91.1 44.9	86.0 42.3	71.1 35.0	30.1 35.3
Black spruce.....	4''-9'' 10'' up	0.9 2.3	0.8 2.2	0.7 1.8	.....	24.6 5.4	23.2 5.1	19.2 4.2	.....
Balsam fir.....	4''-9'' 10'' up	67.3 17.9	64.0 17.0	53.2 14.2	107.4 84.3	119.0 5.0	112.3 4.7	92.8 3.9	103.7
Hemlock.....	4''-9'' 10'' up	126.0 615.4	119.9 585.3	99.7 486.6	.....	79.0 89.0	74.5 84.0	61.6 69.4	64.6
White cedar.....	4''-9'' 10'' up	59.2 152.2	56.3 144.8	46.8 120.4	24.2 148.6	57.3 64.7	54.1 61.0	44.7 50.5	41.6 21.4
TOTAL CONIFERS.....	4''-9'' 10'' up	291.8 957.6	277.5 910.8	230.7 757.4	131.6 232.9	556.3 287.7	524.9 271.4	433.9 224.4	337.1 215.1
Hard maple.....	4''-9'' 10'' up	82.5 261.4	78.5 248.6	65.3 206.7	.....	26.3 29.7	24.8 28.0	20.5 23.2	.....
Yellow birch.....	4''-9'' 10'' up	68.9 915.5	65.5 870.9	54.5 723.8	985.5	27.7 126.3	26.2 119.1	21.6 98.5	.....
Hornbeam.....	4''-9'' 10'' up	5.9 0.4	5.6 0.4	4.7 0.3	.....	3.5 0.5	3.3 0.5	2.7 0.4	.....
Red oak.....	4''-9'' 10'' up	.....	.....	.....	.....	17.6 4.4	16.6 4.2	13.8 3.4	.....
White birch.....	4''-9'' 10'' up	43.5 212.1	41.3 201.8	34.4 167.7	.....	234.7 91.3	221.5 86.1	183.1 71.2	149.2
Poplar (all).....	4''-9'' 10'' up	57.7 128.4	54.9 122.2	45.6 101.6	.....	369.4 136.6	348.5 128.9	288.1 106.5	52.7
Red maple.....	4''-9'' 10'' up	22.1 22.1	21.0 21.0	17.5 17.4	.....	34.0 8.0	32.1 7.5	26.6 6.2	43.9
Black ash.....	4''-9'' 10'' up	31.7 28.2	30.2 26.8	25.1 22.3	.....	26.2 19.8	24.7 18.7	20.5 15.4	.....
Basswood.....	4''-9'' 10'' up	2.8 22.4	2.6 21.4	2.2 17.8	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4''-9'' 10'' up	315.1 1590.5	299.6 1513.1	249.3 1257.6	985.5	739.4 416.6	697.7 393.0	576.9 324.8	245.8
GRAND TOTAL.....	4''-9'' 10'' up	606.9 2548.1	577.1 2423.9	480.0 2015.0	131.6 1218.4	1295.7 704.3	1222.6 664.4	1010.8 549.2	582.9 215.1
TOTAL 4'' UP.....		3155.0	3001.0	2495.0	1350.0	2000.0	1887.0	1560.0	798.0

TABLE 19. — *Volume of the primary growing stock in cubic feet per acre.*  
Timagami Section — 1948

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	28.0 905.3	27.2 878.0	24.6 796.5	9.6 472.3	48.4 82.3	45.2 76.9	36.4 61.9	.....
Red pine.....	4"-9" 10" up	29.4 706.3	28.5 685.0	25.9 621.3	.....	61.7 114.5	57.6 107.0	46.4 86.2	.....
Jack pine.....	4"-9" 10" up	390.9 260.6	379.1 252.8	343.9 229.2	66.7 171.4	590.2 51.3	551.5 48.0	444.2 38.6	228.8 25.4
White spruce.....	4"-9" 10" up	44.8 79.6	43.5 77.2	39.4 70.1	39.4 73.1	44.8 32.4	41.9 30.3	33.7 24.4	63.4 71.6
Black spruce.....	4"-9" 10" up	306.1 107.5	296.8 104.3	269.3 94.6	73.6 25.8	441.9 49.1	412.9 45.9	332.6 36.9	95.9 14.3
Balsam fir.....	4"-9" 10" up	81.7 6.1	79.2 6.0	71.9 5.4	56.2	76.0 3.2	71.0 3.0	57.2 2.4	126.8
White cedar.....	4"-9" 10" up	195.1 258.7	189.3 250.9	171.7 227.6	156.6 383.4	102.7 65.6	95.9 61.3	77.3 49.4	6.8 5.2
Larch.....	4"-9" 10" up	.....	.....	.....	.....	23.6 0.2	22.0 0.2	17.7 0.2	.....
TOTAL CONIFERS.....	4"-9" 10" up	1076.0 2324.1	1043.6 2254.2	946.7 2044.7	402.1 1126.0	1389.3 398.6	1298.0 372.6	1045.5 300.0	521.7 116.5
Hard maple.....	4"-9" 10" up	3.7	3.6	3.2	.....	.....	.....	.....	.....
Yellow birch.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	.....
White birch.....	4"-9" 10" up	84.9 138.4	82.3 134.3	74.6 121.8	65.6 262.5	45.9 74.9	42.9 69.9	34.5 56.4	44.4 42.6
Poplar (all).....	4"-9" 10" up	17.1 15.8	16.6 15.4	15.1 13.9	10.9 7.9	47.8 23.5	44.6 22.0	35.9 17.7	24.8
Black ash.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9" 10" up	105.7 154.2	102.5 149.7	92.9 135.7	76.5 270.4	93.7 98.4	87.5 91.9	70.4 74.1	69.2 42.6
GRAND TOTAL.....	4"-9" 10" up	1181.7 2478.3	1146.1 2403.9	1039.6 2180.4	478.6 1396.4	1483.0 497.0	1385.5 464.5	1115.9 374.1	590.9 159.1
TOTAL 4" UP.....		3660.0	3550.0	3220.0	1875.0	1980.0	1850.0	1490.0	750.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	5.4 128.5	5.2 125.1	4.7 113.9	19.0 81.0	7.0 51.3	6.5 47.7	5.2 38.3	.....
Red pine.....	4"-9" 10" up	.....	.....	.....	30.7 97.2	.....	.....	.....	.....
Jack pine.....	4"-9" 10" up	.....	.....	.....	.....	21.1 14.6	19.6 13.6	15.8 10.9	.....
White spruce.....	4"-9" 10" up	11.4 83.8	11.1 81.5	10.1 74.2	9.7 44.4	28.8 27.6	26.8 25.7	21.5 20.7	.....
Black spruce.....	4"-9" 10" up	5.2 0.7	5.1 0.7	4.7 0.6	.....	8.9 0.5	8.4 0.4	6.6 0.4	.....
Balsam fir.....	4"-9" 10" up	34.3 1.4	33.3 1.4	30.3 1.3	.....	19.5 1.2	18.0 1.2	14.6 0.9	.....
White cedar.....	4"-9" 10" up	5.1 9.8	4.9 9.6	4.5 8.7	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9" 10" up	61.4 224.2	59.6 218.3	54.3 198.7	59.4 222.6	85.3 95.2	79.3 88.6	63.7 71.2	.....
Hard maple.....	4"-9" 10" up	159.3 295.9	155.0 287.9	141.1 262.1	.....	31.5 19.3	29.3 18.0	23.5 14.4	.....
Yellow birch.....	4"-9" 10" up	51.1 517.1	49.8 503.1	45.3 458.0	.....	6.8 42.1	6.4 39.1	5.1 31.4	.....



TABLE 19 — (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Hornbeam	4"-9" 10" up	3.0	2.9	2.6	.....	.....	.....	.....	.....
White birch.....	4"-9" 10" up	134.2 475.7	130.6 462.9	118.8 421.4	158.3 61.5	508.1 89.7	473.0 83.5	379.8 67.0	137.2 197.4
Poplar (all).....	4"-9" 10" up	185.3 844.0	180.3 821.4	164.1 747.6	865.0 273.2	791.6 210.4	736.9 195.9	591.6 157.3	380.4 .....
Red maple.....	4"-9" 10" up	13.1 10.7	12.8 10.4	11.6 9.4	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9" 10" up	546.0 2143.4	531.4 2085.7	483.5 1898.5	1023.3 334.7	1338.0 361.5	1245.6 336.5	1000.0 270.1	517.6 197.4
GRAND TOTAL.....	4"-9" 10" up	607.4 2367.6	591.0 2304.0	537.8 2097.2	1082.7 557.3	1423.3 456.7	1324.9 425.1	1063.7 341.3	517.6 197.4
TOTAL 4" UP.....		2975.0	2895.0	2635.0	1640.0	1880.0	1750.0	1405.0	715.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
White pine.....	4"-9" 10" up	18.7 354.9	18.3 347.1	16.5 314.3	23.8 452.2	94.1 174.7	90.7 168.5	76.6 142.3	5.7 185.1
Red pine.....	4"-9" 10" up	11.1 211.3	10.9 206.6	9.8 187.1	21.7 195.3	14.3 69.7	13.8 67.2	11.6 56.8	.....
Jack pine.....	4"-9" 10" up	44.8 121.2	43.8 118.6	39.7 107.3	.....	112.5 84.9	108.5 81.8	91.6 69.1	.....
White spruce.....	4"-9" 10" up	75.9 161.3	74.2 157.8	67.2 142.8	63.8 74.8	141.1 26.9	136.1 25.9	114.9 21.9	48.2 36.4
Black spruce.....	4"-9" 10" up	50.9 14.3	49.8 14.0	45.0 12.7	60.7 10.7	108.2 9.4	104.3 9.1	88.1 7.7	56.9 26.8
Balsam fir.....	4"-9" 10" up	105.2 10.4	102.9 10.2	93.2 9.2	32.2	78.6 3.3	75.8 3.2	64.0 2.7	86.4
White cedar.....	4"-9" 10" up	71.2 151.2	69.6 147.9	63.0 133.9	7.0	25.9 20.3	24.9 19.6	21.1 16.5	6.9 14.7
TOTAL CONIFERS.....	4"-9" 10" up	377.8 1024.6	369.5 1002.2	334.4 907.3	209.2 733.0	574.7 389.2	554.1 375.3	467.9 317.0	204.1 263.0
Hard maple.....	4"-9" 10" up	28.0 37.2	27.4 36.4	24.8 32.9	.....	16.3 2.6	15.6 2.6	13.2 2.2	26.7 7.5
Yellow birch.....	4"-9" 10" up	23.7 272.8	23.2 266.8	21.0 241.5	.....	7.9 6.8	7.7 6.5	6.5 5.5	.....
White birch.....	4"-9" 10" up	241.1 562.5	235.8 550.1	213.4 498.0	167.8 131.8	398.4 170.7	384.2 164.6	324.4 139.0	112.9 184.1
Poplar (all).....	4"-9" 10" up	127.1 270.2	124.4 264.2	112.5 239.2	94.9 63.3	325.4 208.0	313.8 200.6	264.9 169.4	43.7 58.0
TOTAL HARDWOODS.....	4"-9" 10" up	419.9 1142.7	410.8 1117.5	371.7 1011.6	262.7 195.1	748.0 388.1	721.3 374.3	609.0 316.1	183.3 249.6
GRAND TOTAL.....	4"-9" 10" up	797.7 2167.3	780.3 2119.7	706.1 1918.9	471.9 928.1	1322.7 777.3	1275.4 749.6	1076.9 633.1	387.4 512.6
TOTAL 4" UP.....		2965.0	2900.0	2625.0	1400.0	2100.0	2025.0	1710.0	900.0

TABLE 20. — Volume of the primary growing stock in cubic feet per acre.  
Algoma Section — 1951

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	4.3 95.3	4.1 90.9	3.3 74.5	1.4 31.2	58.5 134.5	54.6 125.7	42.1 96.8	39.9 222.4
Red pine.....	4"-9" 10" up	.....	.....	.....	.....	24.4 35.1	22.8 32.8	17.6 25.3	73.4 39.6
Jack pine.....	4"-9" 10" up	.....	.....	.....	.....	12.4 10.2	11.6 9.5	8.9 7.4	168.3 .....
White spruce.....	4"-9" 10" up	36.6 124.7	34.9 118.9	28.6 97.3	12.0 40.8	37.0 43.1	34.6 40.2	26.6 31.0	..... .....
Black spruce.....	4"-9" 10" up	463.6 240.9	442.0 229.8	362.0 188.1	151.9 78.9	181.0 18.1	169.2 16.9	130.4 13.0	21.2 .....
Balsam fir.....	4"-9" 10" up	236.6 55.2	225.6 52.6	184.7 43.1	77.5 18.1	303.3 43.7	283.3 40.8	218.3 31.5	92.7 71.0
Hemlock.....	4"-9" 10" up	.....	.....	.....	.....	7.0 62.8	6.5 58.7	5.0 45.2	..... .....
White cedar.....	4"-9" 10" up	392.1 369.3	373.9 352.2	306.2 288.3	128.4 121.0	428.4 210.1	400.3 196.2	308.5 151.2	..... .....
Larch.....	4"-9" 10" up	68.0 34.0	64.9 32.4	53.1 26.5	22.3 11.1	65.1 12.9	60.8 12.1	46.9 9.3	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	1201.2 919.4	1145.4 876.8	937.9 717.8	393.5 301.1	1117.1 570.5	1043.7 532.9	804.3 410.7	395.5 333.0
Hard maple.....	4"-9" 10" up	.....	.....	.....	.....	10.4 6.0	9.8 5.6	7.5 4.3	..... .....
Yellow birch.....	4"-9" 10" up	12.2 61.3	11.6 58.5	9.5 47.9	4.0 20.1	11.4 101.5	10.7 94.8	8.2 73.1	..... .....
Red oak.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	12.9
White birch.....	4"-9" 10" up	92.1 55.0	87.8 52.5	71.9 42.9	30.2 18.0	48.0 69.0	44.8 64.5	34.5 49.7	..... .....
Poplar (all).....	4"-9" 10" up	0.7 4.0	0.7 3.8	0.6 3.1	0.2 1.4	37.0 65.7	34.5 61.4	26.6 47.3	12.1 .....
Red maple.....	4"-9" 10" up	11.3 10.1	10.8 9.6	8.8 7.9	3.7 3.3	13.5 2.9	12.6 2.7	9.7 2.1	4.5 .....
Ash.....	4"-9" 10" up	4.7	4.5	3.7	1.5	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9" 10" up	121.0 130.4	115.4 124.4	94.5 101.8	39.6 42.8	120.3 245.1	112.4 229.0	86.5 176.5	16.6 12.9
GRAND TOTAL.....	4"-9" 10" up	1322.2 1049.8	1260.8 1001.2	1032.4 819.6	433.1 343.9	1237.4 815.6	1156.1 761.9	890.8 587.2	412.1 345.9
TOTAL 4" UP.....		2372.0	2262.0	1852.0	777.0	2053.0	1918.0	1478.0	758.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
White pine.....	4"-9" 10" up	.....	.....	.....	.....	2.0 13.1	2.0 13.0	1.9 12.4	..... 109.2
Red pine.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	324.2
White spruce.....	4"-9" 10" up	2.8 13.2	2.7 13.0	2.6 12.2	1.5 7.3	3.4 5.7	3.4 5.6	3.3 5.3	..... .....
Balsam fir.....	4"-9" 10" up	31.5 7.0	30.9 6.9	29.0 6.5	17.2 3.8	35.1 7.1	34.9 7.0	33.4 6.7	6.6 .....
Hemlock.....	4"-9" 10" up	5.4 94.1	5.3 92.3	5.0 86.7	2.9 51.4	4.4 24.2	4.4 24.0	4.2 23.0	..... .....
White cedar.....	4"-9" 10" up	10.6 37.5	10.4 36.8	9.8 34.6	5.8 20.5	5.8 1.7	5.8 1.7	5.6 1.6	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	50.3 151.8	49.3 149.0	46.4 140.0	27.4 83.0	50.7 51.8	50.5 51.3	48.4 49.0	6.6 433.4
Hard maple.....	4"-9" 10" up	297.5 1422.0	291.9 1395.4	274.3 1311.2	162.6 777.0	227.6 242.6	226.1 241.0	216.3 230.5	..... .....
Yellow birch.....	4"-9" 10" up	42.5 923.1	41.7 905.9	39.2 851.1	23.2 504.4	47.0 127.8	46.7 126.9	44.7 121.4	..... .....

TABLE 20 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Elm.....	4''-9''	6.4	6.3	5.9	3.5	10.2	10.1	9.7	
	10'' up	22.5	22.0	20.7	12.3	13.9	13.8	13.2	
Ironwood.....	4''-9''	12.6	12.5	11.7	6.9	7.7	7.6	7.3	
	10'' up	3.4	3.3	3.1	1.9	1.4	1.4	1.3	.....
Red oak.....	4''-9''	5.5	5.4	5.1	3.0	27.0	26.9	25.7	
	10'' up	36.2	35.5	33.3	19.8	18.2	18.0	17.3	
White birch.....	4''-9''	18.2	17.9	16.8	10.0	127.3	126.4	121.0	62.8
	10'' up	52.4	51.4	48.3	28.6	27.9	27.8	26.5	
Poplar (all).....	4''-9''	23.5	23.0	21.6	12.8	337.0	334.8	320.2	324.2
	10'' up	85.6	84.0	79.0	46.8	88.0	87.4	83.6	.....
Red maple.....	4''-9''	13.1	12.9	12.1	7.2	48.4	48.1	46.0	
	10'' up	35.0	34.3	32.3	19.1	23.9	23.8	22.7	.....
Ash.....	4''-9''	5.2	5.2	4.8	2.9	17.3	17.2	16.5	
	10'' up	1.2	1.1	1.1	0.6	11.3	11.2	10.7	.....
TOTAL HARDWOODS.....	4''-9''	424.5	416.8	391.5	232.1	849.5	843.9	807.4	387.0
	10'' up	2581.4	2532.9	2380.1	1410.5	555.0	551.3	527.2	.....
GRAND TOTAL.....	4''-9''	474.8	466.1	437.9	259.5	900.2	894.4	855.8	393.6
	10'' up	2733.2	2681.9	2520.1	1493.5	606.8	602.6	576.2	433.4
TOTAL 4'' UP.....		3208.0	3148.0	2958.0	1753.0	1507.0	1497.0	1432.0	827.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4''-9''	2.1	2.0	2.0	1.2	43.1	42.1	36.4	151.5
	10'' up	66.5	66.2	63.0	40.4	177.9	173.6	150.1	435.7
Red pine.....	4''-9''	.....	.....	.....	.....	7.2	7.0	6.1	10.5
	10'' up	.....	.....	.....	.....	9.5	9.3	8.0	84.4
White spruce.....	4''-9''	19.8	19.7	18.7	12.0	38.9	38.0	32.8	
	10'' up	61.3	60.9	58.1	37.1	59.1	57.6	49.9	.....
Black spruce.....	4''-9''	8.1	8.0	7.7	4.9	17.9	17.4	15.1	
	10'' up	7.5	7.5	7.1	4.5	9.2	9.0	7.8	.....
Balsam fir.....	4''-9''	145.1	144.2	137.5	87.9	281.4	274.6	237.4	
	10'' up	57.6	57.2	54.5	34.9	43.9	42.9	37.0	.....
Hemlock.....	4''-9''	19.7	19.6	18.7	11.9	12.2	11.9	10.3	
	10'' up	220.5	219.0	208.8	133.6	52.4	51.2	44.2	.....
White cedar.....	4''-9''	76.8	76.3	72.8	46.5	58.4	57.0	49.2	
	10'' up	331.8	329.7	314.2	201.0	47.9	46.8	40.5	.....
TOTAL CONIFERS.....	4''-9''	271.6	269.8	257.4	164.4	459.1	448.0	387.3	162.0
	10'' up	745.2	740.5	705.7	451.5	399.9	390.4	337.5	520.1
Hard maple.....	4''-9''	121.3	120.5	114.8	73.4	100.7	98.2	84.9	3.4
	10'' up	552.4	548.9	523.2	334.6	128.6	125.6	108.6	.....
Yellow birch.....	4''-9''	71.4	70.9	67.6	43.2	37.2	36.3	31.4	
	10'' up	1026.5	1019.9	972.2	621.7	210.9	205.9	177.9	.....
Ironwood.....	4''-9''	2.4	2.3	2.3	1.5	.....	.....	.....	
	10'' up	0.7	0.7	0.7	0.4	.....	.....	.....	
Red oak.....	4''-9''	2.1	2.1	2.0	1.3	9.7	9.5	8.2	75.9
	10'' up	16.6	16.5	15.7	10.0	7.0	6.8	5.9	44.2
White birch.....	4''-9''	32.5	32.3	30.7	19.7	143.6	140.2	121.2	
	10'' up	79.8	79.3	75.6	48.3	112.9	110.1	95.2	.....
Poplar (all).....	4''-9''	33.6	33.4	31.8	20.3	181.0	176.6	152.7	
	10'' up	88.1	87.5	83.4	53.4	142.2	138.8	119.9	.....
Red maple.....	4''-9''	26.0	25.8	24.6	15.7	74.6	72.8	62.9	34.4
	10'' up	27.0	26.9	25.6	16.4	54.7	53.4	46.1	
Ash.....	4''-9''	9.9	9.9	9.4	6.0	16.8	16.4	14.1	
	10'' up	11.9	11.8	11.3	7.2	6.1	6.0	5.2	
TOTAL HARDWOODS.....	4''-9''	299.2	297.2	283.2	181.1	563.6	550.0	475.4	113.7
	10'' up	1803.0	1791.5	1707.7	1092.0	662.4	646.6	558.8	44.2
GRAND TOTAL.....	4''-9''	570.8	567.0	540.6	345.5	1022.7	998.0	862.7	275.7
	10'' up	2548.2	2532.0	2413.4	1543.5	1062.3	1037.0	896.3	564.3
TOTAL 4'' UP.....		3119.0	3099.0	2954.0	1889.0	2085.0	2035.0	1759.0	840.0



## *Notes*

---





**Hon. Welland S. Gemmell**

*Minister*

**F. A. MacDougall**

*Deputy Minister*



Report No. 12 of the  
**CHAPLEAU DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management

Ontario Department of Lands and Forests



# *Forest Resources Inventory*

— 1953 —

Report No. 12 of the  
**CHAPLEAU DISTRICT**



Division of Timber Management  
**Ontario Department of Lands and Forests**





## PREFACE

● A country's natural resources determine to a very great extent its economic position among its neighbours. The extent to which it is able to use these resources wisely determines its ability to maintain its economic position, to take full advantage of new technological developments and to promote a sound economy. At a time when all of our resources are being so prodigally spent, when other nations throughout the world are experiencing extreme shortages, and when it is apparent that there is no such thing as an inexhaustible supply; it is of greater importance than ever before that this basic wealth be wisely used.

Every operation in growing, transporting, and using forest products starts a flow of income the ultimate recipients of which are far removed in time and space from the original operation. No amount of search will discover all of the benefits derived from the multitude of uses of forests and forest products, but a recognition of the ever-widening circle of these benefits is necessary to clearly understand the economic role of forests. An appreciation of these values must be based upon a realistic appraisal of the present status of the resource, its importance in the social and economic life of the Province and the problems involved in its full development. One of the important undertakings of the Department of Lands and Forests in recent years is, therefore, a province-wide survey of the forest resources of Ontario as the first step in a broad program of forest management and development.

The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to Ontario one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources, the Department of Lands and Forests which administers them, has set up twenty-two districts, each administered by a District Forester and staff from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these forest administrative districts, totalling 172,000 square miles in area, and comprising the exploitable, or accessible, forest area of Ontario. This report, the twelfth in the series, deals with the results of the inventory in the Chapleau district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the Province as a whole. At the same time the report supplies the essential data for the planning of the long term management of the forest resources.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	21
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	24
AREAS.....	9	APPENDIX.....	26
FOREST LAND OWNERSHIP.....	10	SURVEY METHODS.....	26
AGE CLASSES.....	11	MEAN ANNUAL INCREMENT.....	26
REGIONAL FOREST TYPES.....	11	AGE CLASSES.....	26
COVER TYPES.....	13	ROTATION.....	27
VOLUME.....	15	ALLOWABLE CUT.....	27
CONIFERS VS. HARDWOODS.....	17	CULL FACTOR.....	28
SAWLOGS VS. PULPWOOD.....	19		

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES, CHAPLEAU DISTRICT.....	9	FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LANDS BY SIZE CLASSES.....	19
FIG. 2 — LAND OWNERSHIP WITHIN THE CHAPLEAU DISTRICT.....	10	FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF CONIFEROUS SPECIES ON CROWN LAND BY AGE CLASSES AND SIZE CLASSES.....	20
FIG. 3 — CHAPLEAU DISTRICT, 1953.....	10	FIG. 12 — VOLUME OF THE PRIMARY GROWING STOCK OF PRINCIPAL HARDWOOD SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	21
FIG. 4 — ECOLOGICAL DIVISIONS.....	12	FIG. 13 — VOLUME OF MATURE TIMBER BY SIZE CLASSES ON PATENTED LAND.....	22
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	13	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON CROWN LAND IN THE CHAPLEAU DISTRICT.....	23
FIG. 6 — VOLUME OF PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	14	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK BY SPECIES ON PATENTED LAND.....	24
FIG. 7 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SPECIES AND AGE CLASSES.....	18	FIG. 16 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LAND.....	25
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	19	FIG. 17 — AREA COMPANY INVENTORY USED.....	27
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SIZE CLASSES.....	19		





# SURVEY HIGHLIGHTS

1. The Chapleau district occupies part of the Height-of-Land separating the waters flowing into James and Hudson Bay from those of the Great Lakes drainage system. The major part of the district belongs in the Central Transition forest region where optimum growing conditions for jack pine exist. By land, the district is accessible by the Canadian Pacific Railway and a single road connecting the main town of Chapleau with Thessalon. Industrial development in the district is confined to only a few sawmills which are located along the railway.

2. The total area of the district is 4,189,012 acres or 6,545 square miles. Productive forest lands occupy 3,325,739 acres, 79 per cent of the total area. Water covers almost 10 per cent and 11 per cent is made up almost wholly of non-productive forest and non-forested lands. Patented lands cover only 2 per cent of the district.

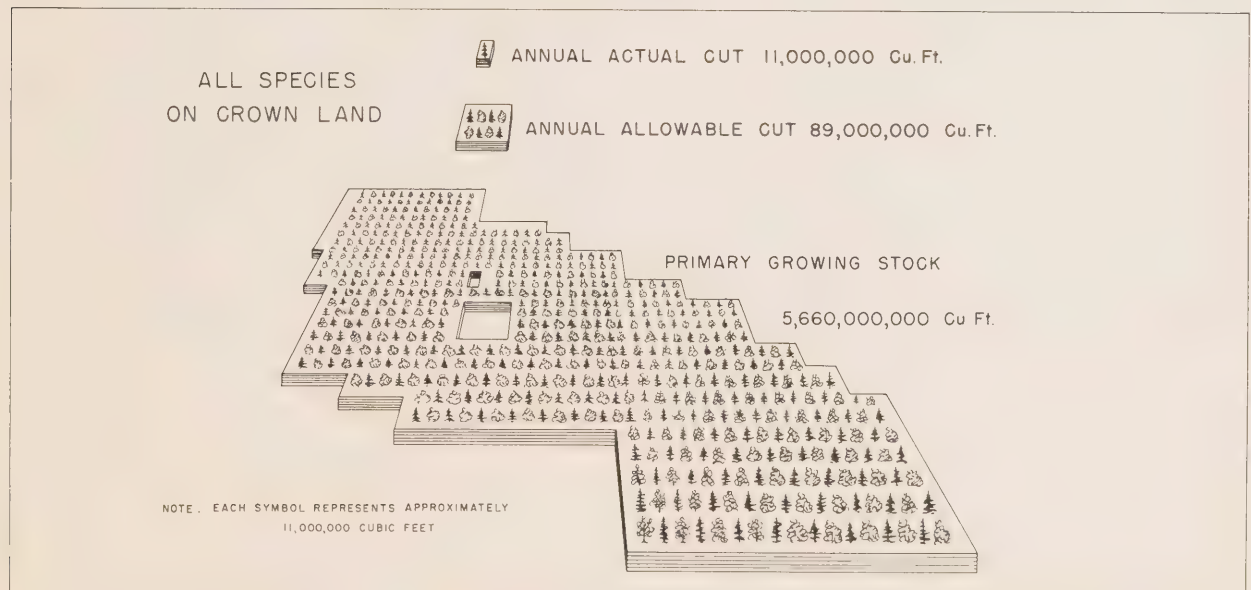
3. The total timber resources of the district are 5.8 billion cubic feet; 3.4 billion cubic feet or 59 per cent being coniferous or softwood species, and 2.4 billion cubic feet or 41 per cent hardwoods. Jack pine is the most important species making up 43 per cent of the conifer stock on Crown land,

with black spruce contributing 30 per cent. Other coniferous species such as white and red pine, white spruce, balsam fir, white cedar and larch make up 27 per cent of the coniferous primary growing stock.

4. The annual allowable cut on Crown lands is slightly over 89 million cubic feet; approximately one-half of the volume being coniferous species and the other half hardwoods. Poplar and white birch form 98 per cent of the hardwood allowable cut while jack pine forms more than one-half the allowable cut of conifers.

5. The average volume of wood utilized annually in the district is 11,324,245 cubic feet or slightly over 12 per cent of the annual allowable cut. Of all wood utilized from Crown lands, 9,227,172 cubic feet or 82 per cent is jack pine, 15 per cent spruce, one per cent white and red pine and 2 per cent poplar.

6. A comparison of the annual allowable cut with the actual utilization of timber for Crown lands shows that 25 per cent of the coniferous allowable cut is being utilized and less than one per cent of the hardwoods, thus leaving large unutilized volumes in the district.







*Forest resources inventory photograph of Chapleau, Ontario, taken with a six-inch focal length aerial camera from an altitude of 7,920 feet. Scale of photograph: 4 inches to the mile.*





# FOREST INVENTORY

## Areas

● The total area of the Chapleau district, excluding Indian Reserve lands, is 4,189,012 acres (table 1), 6,545 square miles, made up of 187 townships, one of which is entirely Indian Reserve land. Water covers an area of 402,989 acres, almost 10 per cent of the total area, leaving a net land area of 3,786,023 acres. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 437,525 acres, slightly over 10 per cent of the total area. Non-forested lands, including lands permanently

TABLE 1.—Total area classification into broad land and ownership groupings.

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	3,234,571	91,168	3,325,739
Non-forested land <sup>2</sup>			
Developed agricultural land.....	20	430	450
Grass and meadow land.....	462	62	524
Non-reproducing burn.....	16,316		16,316
Unclassified land <sup>3</sup> .....	3,979	1,490	5,469
TOTAL.....	20,777	1,982	22,759
Non-productive forest <sup>4</sup>			
Open muskeg.....	228,697	2,348	231,045
Treed muskeg (scrub).....	58,346	2,198	60,544
Brush, alder and flooded land.....	140,209	972	141,181
Rock outcrop.....	2,062	2	2,064
Barrens.....	2,691		2,691
TOTAL.....	432,005	5,520	437,525
Water.....	402,989		402,989
TOTAL AREA.....	4,090,342	98,670	4,189,012

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

withdrawn from timber production, comprise 22,759 acres or less than one per cent of the total area (fig. 1). This classification contains the very limited

area of developed agricultural land of 450 acres, pasture lands totalling 524 acres, 16,316 acres of non-reproducing burn, and 5,469 acres comprising lands occupied by towns, villages, roads and railroads or otherwise withdrawn from forest production.

The Chapleau district is essentially a timber producing area with 3,325,739 acres or slightly over 79 per cent of the total area classified as productive forest land. The district lies on the Height-of-Land separating the waters flowing into James

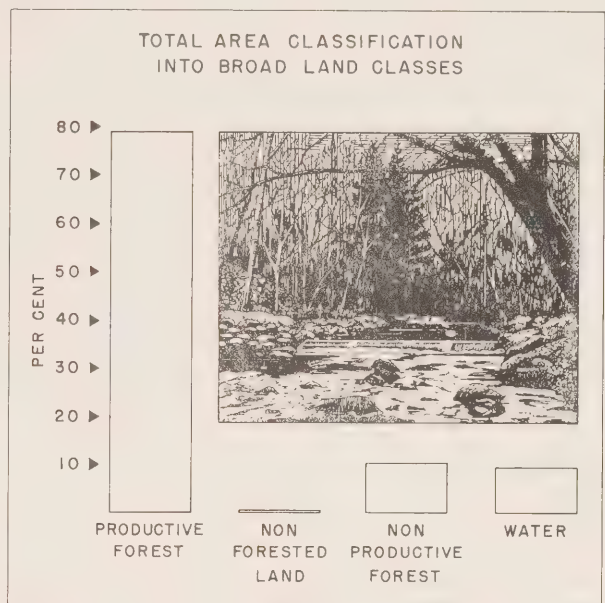


FIGURE 1

and Hudson Bay from those of the Great Lakes-St. Lawrence drainage system. The thin rocky and coarse sandy and gravelly soils of the district offer little prospects for future agricultural development. Industrial development in the district is confined to a few sawmills located along the main line of the Canadian Pacific Railway which traverses the district in a northwesterly direction. One highway connects Chapleau, the main town of the district, with Thessalon, on the Sudbury to Sault Ste. Marie highway. Except for the limited growth of the sawmilling industry in the district, the forests are for the most part reserve supplies for manufacturing

plants established outside the district or held in reserve for future industrial development.



### Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators, for varying lengths of time, the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement, and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort, and other uses. All of these various types of ownership are grouped under "patented lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at the time the patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands presents, therefore, a complicated picture. In the course of the inventory no attempt was made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

Of the total area of the Chapleau district of 4,189,012 acres, 4,090,342 acres are in the ownership of the Crown, and 98,670 acres are patented land (table 1). Taking the total area of the district into consideration, 98 per cent is Crown land and 2 per cent is patented land. Considering only the productive forest land totalling 3,325,739 acres, almost the same percentage holds true with 97 per cent in Crown ownership and 3 per cent patented land (fig. 2). Patented land is further classified on a township basis into those townships containing less than 10 per cent patented land; those containing between 10 and 50 per cent patented lands, and townships containing over 50 per cent patented

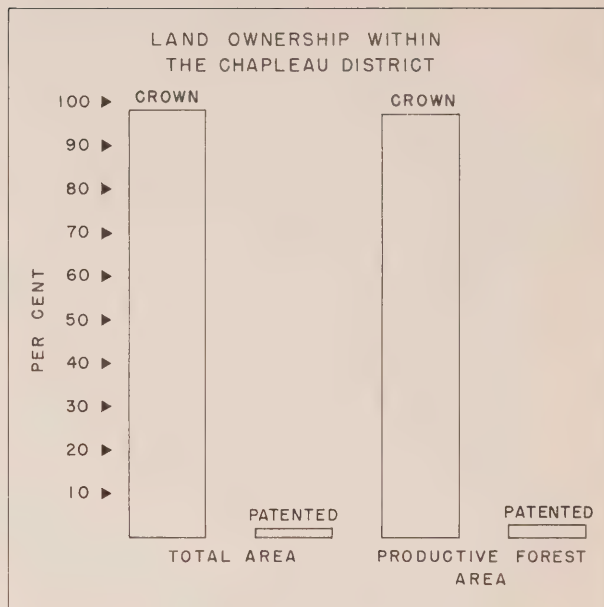
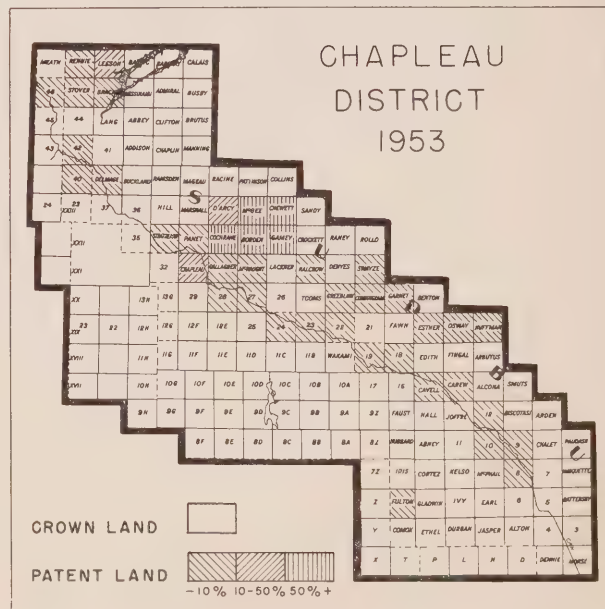


FIGURE 2

lands (fig. 3). Five townships: Borden, Cochrane, Chewett, Gamey and McGee contain 73,976 acres or 75 per cent of all patented lands in the Chapleau district. These lands were granted originally to war veterans as "Veteran Script" lands and have since been purchased and are held in a block owned by a large pulp and paper company and are managed as a forest property. The balance of 25 per

FIGURE 3





cent of the patented lands of the district are in small parcels scattered throughout the townships adjacent to the railroad.



### Age Classes

For sustained yield operations a forest should contain trees of all age classes and stages of development from seedlings to mature timber, in such

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	
	<i>acres</i>	<i>acres</i>	<i>acres</i>	<i>per cent</i>
Mature forest:				
Coniferous.....	484,697	21,512	506,209	15
Hardwood.....	137,166	5,892	143,058	4
Mixedwoods.....	1,158,952	40,168	1,199,120	36
TOTAL.....	1,780,815	67,572	1,848,387	55
Immature forest:				
Coniferous.....	453,717	7,024	460,741	14
Hardwood.....	90,004	3,404	93,408	3
Mixedwoods.....	618,577	5,642	624,219	19
TOTAL.....	1,162,298	16,070	1,178,368	36
Young growth:				
Coniferous.....	40,082	786	40,868	1
Hardwood.....	6,367	262	6,629	*
Mixedwoods.....	87,457	1,818	89,275	3
TOTAL.....	133,906	2,866	136,772	4
Reproducing forest...	157,552	4,660	162,212	5
TOTAL PRODUCTIVE FOREST.....	3,234,571	91,168	3,325,739	100

\*Less than one per cent.

proportions that when one group of trees is harvested, another is ready to take its place. Since forest utilization has been on such a small scale

to date in the Chapleau district, the present age class distribution represents a natural state rather than one created by cultural operations aimed at a balanced age class distribution.

For the district as a whole, 1,848,387 acres or 55 per cent of the productive forest is in the mature age class, 1,178,368 acres or 36 per cent is immature, 136,772 acres or 4 per cent is young growth and 162,212 acres or 5 per cent is reproducing forest (table 2). Since 97 per cent of the productive forest land of the district is Crown land, the age class distribution for the Crown land portion does not differ from the distribution for the productive forest land. The age class distribution for the 3 per cent of the productive forest area in private ownership shows a still greater preponderance of mature timber with: 67,572 acres or 74 per cent mature, 16,070 acres or 18 per cent immature, 2,866 acres or 3 per cent young growth and 4,660 acres or 5 per cent reproducing forest.



### Regional Forest Types

The regional distribution of forest types in Ontario is influenced by the lowering in temperature from south to north and a reduction in rainfall and general atmospheric humidity from east to west. The regularity of the response of forest growth to these two variable factors is modified by the proximity of large bodies of water, especially the "Great Lakes" system, topography, the distribution of broad soil types and other local conditions. These factors are expressed in the limits of distribution of certain commercial tree species, and in the volume and growth rate of the forest. Separate volume tables and yield tables are made for each region, or section, and they serve as units in the compilation of volume estimates. The Chapleau district occupies part of the Height-of-Land area in Ontario and is far removed from the moderating influence of large bodies of water. The major part of the district



*"Come and get it . . ." It's dinnertime  
at a Sultan, Ontario, Camp.*

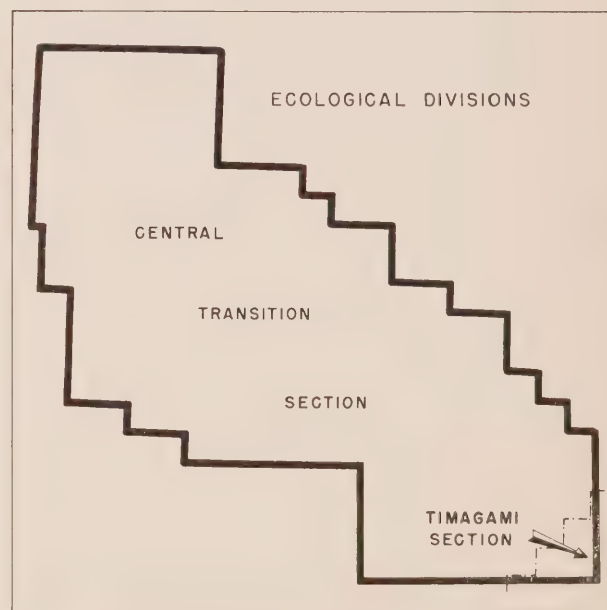
belongs to the Central Transition forest region, or section, with only a limited area in the southeasterly portion of the district belonging to the Timagami section which is characterized by the presence of white and red pine in consolidated commercial stands. These two forest regions, or sections (fig. 4), may be described as follows.

The Central Transition section, covering 98 per cent of the district, belongs to the Boreal forest zone. White pine and tolerant hardwoods, maple and yellow birch are represented by only a few

scattered outliers. Spruce-fir stands occupy all of the well-drained heavier soils as a mature forest. Jack pine stands, dense and of good development, are found on coarse sand and gravelly soils. The Chapleau district and adjoining areas on the Height-of-Land section of Ontario appear to be the area of ecological optimum for jack pine. In this area jack pine reaches its greatest size, attains its maximum rate of growth and occupies a wider range of sites than anywhere throughout its extensive range in eastern Canada. Pure stands of black spruce occur everywhere on low, poorly drained sites, gradually tapering off in growth rate to the open muskegs common in this section. The relatively intolerant poplar and white birch are the only important broadleaved tree species. These are aggressive in taking over logged and burned areas on the well-drained uplands where they also form a component of the mature stands.

The Timagami section, occupying only 2 per cent of the area of the Chapleau district, is noteworthy for the presence of extensive areas of stands of red and white pine which in the absence of substantial competition from the tolerant hardwood components of the Algonquin section have a tendency to grow in relatively pure stands on all of the well-drained soils. Along with the pine are found the characteristic components of the Boreal forest, black and white spruce, balsam fir and jack pine.

FIGURE 4





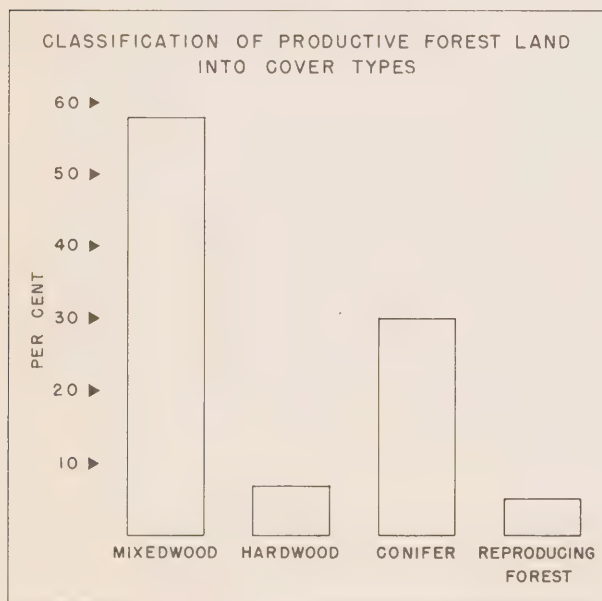


*Sawmill at Flame Lake.*

### *Cover Types*

The forests of the Chapleau district are made up of some 14 common tree species; 8 species make up 97 per cent of the total wood volume. These are: jack pine, making up 26 per cent of the primary

FIGURE 5



growing stock, white birch 20 per cent, poplar 19 per cent, black spruce 18 per cent, white spruce 7 per cent, white cedar 3 per cent, balsam fir 2 per cent, and white pine 2 per cent.

The forests are described under three main cover types: coniferous, hardwood and mixedwoods. The coniferous type contains 75 per cent or more conifers or softwood trees, the hardwood type 75 per cent or more hardwood or broadleaved trees. All other combinations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts, areas of reproducing forests, too recently established to have attained a sufficiently stable composition to be classified into cover types. These areas are referred to as reproducing forest.

Over the productive forest area the mixedwoods type predominates, covering 58 per cent of the area. The coniferous type covers 30 per cent and the hardwood type 7 per cent. The remaining 5 per cent is reproducing forest (table 3, fig. 5).

The distribution of cover types for Crown lands is very similar to the total productive forest with 58 per cent mixedwoods, 30 per cent coniferous, 7 per cent hardwood and 5 per cent reproducing forest.

The distribution of cover types on patented lands,



TABLE 3. — *Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	484,697	15	21,512	24	506,209	15
Immature.....	453,717	14	7,024	8	460,741	14
Young growth..	40,082	1	786	*	40,868	1
TOTAL.....	978,496	30	29,322	32	1,007,818	30
Hardwood type:						
Mature.....	137,166	4	5,892	7	143,058	4
Immature.....	90,004	3	3,404	4	93,408	3
Young growth..	6,367	*	262	*	6,629	*
TOTAL.....	233,537	7	9,558	11	243,095	7
Mixedwoods type:						
Mature.....	1,158,952	36	40,168	44	1,199,120	36
Immature.....	618,577	19	5,642	6	624,219	19
Young growth..	87,457	3	1,818	2	89,275	3
TOTAL.....	1,864,986	58	47,628	52	1,912,614	58
Reproducing forest	157,552	5	4,660	5	162,212	5
TOTAL PRODUCTIVE FOREST.....	3,234,571	100	91,168	100	3,325,739	100

\*Less than one per cent.

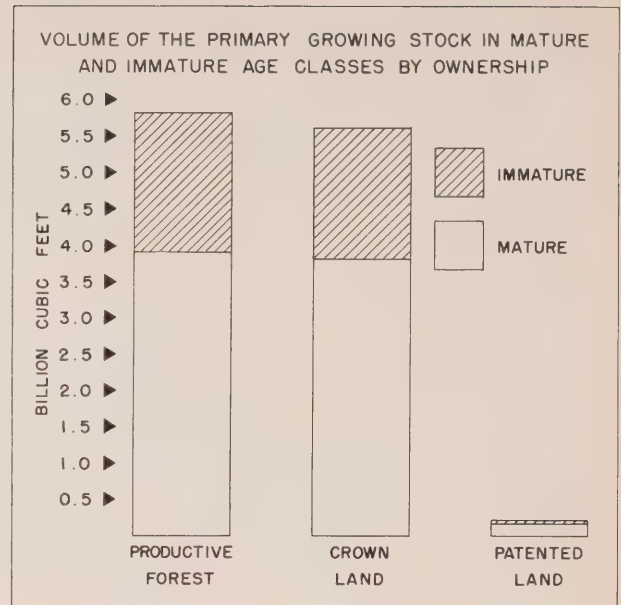


FIGURE 6

which occupy only 3 per cent of the productive area, shows some differences. The mixedwoods type predominates, covering 52 per cent of the patented area, 32 per cent is coniferous, 11 per cent hardwood and 5 per cent reproducing forest (table 3).



A "pointer" runs dangerous "Pig Pen Chutes" during river drive.



### Volume

The volume of the primary growing stock includes all living trees 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Chapleau district is just under 6 billion cubic feet (5,841,594,400 cubic feet). This is an average of 1,756 cubic feet per acre (table 4). The mature age class contains 3.9 billion cubic feet (table 5) or 2,131 cubic feet per acre, while the immature age class contains 1.9 billion cubic feet or 1,615 cubic feet per acre (fig. 6).

On Crown lands, the volume of the primary growing stock is 5,660 million cubic feet (table 6) or an average of 1,750 cubic feet per acre. The mature age class contains 3,784 million cubic feet or 2,125 cubic feet per acre; the immature age class,

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average total
	4"-9" d.b.h.	10"+ d.b.h.	Average	4"-9" d.b.h.	10"+ d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1,066	1,059	2,125	1,144	1,132	2,276	2,131
Immature.....	1,212	402	1,614	1,403	333	1,736	1,615
Productive forest.....	1,023	727	1,750	1,095	898	1,993	1,756

1,876 million cubic feet or 1,614 cubic feet per acre.

Patented lands in the Chapleau district contain a total of 182 million cubic feet (table 7), or 1,993 cubic feet per acre. The mature age class contains 154 million cubic feet or 2,276 cubic feet per acre. The immature age class contains 28 million cubic feet or 1,736 cubic feet per acre (fig. 6).

TABLE 5. — *Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Chapleau district by species groups, age class and cover type in two size classes*

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	719,934	464,470	626,171	125,479	1,936,654
Hardwood.....	165,878	179,311	111,723	50,325	507,237
Mixedwoods.....	1,090,485	1,317,920	693,146	296,752	3,398,303
TOTAL.....	1,976,297	1,961,701	1,431,040	472,556	5,841,594

ALL CONIFERS					
Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	667,279	423,682	584,672	108,603	1,784,236
Hardwood.....	22,089	21,819	12,129	7,033	63,070
Mixedwoods.....	558,574	581,614	328,710	140,100	1,608,998
TOTAL.....	1,247,942	1,027,115	925,511	255,736	3,456,304

ALL HARDWOODS					
Cover type	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	52,655	40,788	41,499	16,876	151,818
Hardwood.....	143,789	157,492	99,594	43,292	444,167
Mixedwoods.....	531,911	736,306	364,436	156,652	1,789,305
TOTAL.....	728,355	934,586	505,529	216,820	2,385,290

TABLE 6. — Cubic-foot volumes of primary growing stock on Crown land in the Chapleau district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	687,143	443,907	615,939	123,507	1,870,496
Hardwood.....	157,824	171,728	106,870	49,231	485,653
Mixedwoods....	1,054,003	1,269,566	685,691	294,466	3,303,726
TOTAL....	1,898,970	1,885,201	1,408,500	467,204	5,659,875

ALL CONIFERS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	637,167	405,471	575,316	106,877	1,724,831
Hardwood.....	21,225	20,840	11,688	6,725	60,478
Mixedwoods....	541,298	561,325	325,452	139,095	1,567,170
TOTAL....	1,199,690	987,636	912,456	252,697	3,352,479

ALL HARDWOODS

Cover type	Mature		Immature		Total Crown lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	49,976	38,436	40,623	16,630	145,665
Hardwood.....	136,599	150,888	95,182	42,506	425,175
Mixedwoods....	512,705	708,241	360,239	155,371	1,736,556
TOTAL....	699,280	897,565	496,044	214,507	2,307,396

TABLE 7. — Cubic-foot volumes of primary growing stock on patented land in the Chapleau district by species groups, age class and cover type in two size classes.

ALL SPECIES					
Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	32,791	20,563	10,232	1,972	65,558
Hardwood.....	8,054	7,583	4,853	1,094	21,584
Mixedwoods....	36,482	48,354	7,455	2,286	94,577
TOTAL....	77,327	76,500	22,540	5,352	181,719

ALL CONIFERS

Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	30,112	18,211	9,356	1,726	59,405
Hardwood.....	864	979	441	308	2,592
Mixedwoods....	17,276	20,289	3,258	1,005	41,828
TOTAL....	48,252	39,479	13,055	3,039	103,825

ALL HARDWOODS

Cover type	Mature		Immature		Total patented lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,679	2,352	876	246	6,153
Hardwood.....	7,190	6,604	4,412	786	18,992
Mixedwoods....	19,206	28,065	4,197	1,281	52,749
TOTAL....	29,075	37,021	9,485	2,313	77,894



### Conifers vs. Hardwoods

The volume of the primary growing stock on productive forest lands in the Chapleau district is 59 per cent coniferous and 41 per cent hardwoods. Conifers total 3,456 million cubic feet and hardwoods 2,385 million cubic feet (table 8). In the mature age class conifers comprise 2,275 million cubic feet or 58 per cent and hardwoods 1,663 million cubic feet or 42 per cent of the total volume. The immature age class shows an increase in the coniferous content as 1,181 million cubic feet or 62 per cent is coniferous volume and 722 million cubic feet or 38 per cent hardwood.

On Crown lands, 3,352 million cubic feet is coniferous volume and 2,307 million cubic feet hardwood volume (table 9). The division into conifers and hardwoods for the total volume, and for the mature and immature age classes separately, is very similar to the forested area as a whole.

On patented lands, the volume of conifers is 104 million cubic feet or 57 per cent of the total volume, while the volume of hardwoods is 78 million cubic feet or 43 per cent of the total volume (table 10). In the mature and immature age classes this same percentage distribution between conifers and hardwoods holds true.

The principal species on Crown land making up the two groups, conifers and hardwoods, are shown in figure 7. Eighty-three per cent of the volume is made up of four species — two conifers, jack pine and black spruce; and two intolerant hardwoods,

white birch and poplar. Jack pine and black spruce comprise 73 per cent of the coniferous volume; white birch and poplar make up 97 per cent of the hardwood volume.

TABLE 8. — *Cubic-foot volumes of primary growing stock on productive forest land in the Chapleau district by species and age classes in two size classes.*

Species	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	3,432	125,071	3,839	10,467	142,809
Red pine.....	718	5,875	1,053	1,886	9,532
Jack pine.....	527,391	452,209	394,092	116,537	1,490,229
White spruce...	126,162	197,468	57,444	46,383	427,457
Black spruce...	466,943	138,385	392,201	41,722	1,039,251
Balsam fir.....	81,389	11,017	44,265	5,806	142,477
White cedar.....	39,276	96,960	21,318	32,342	189,896
Larch.....	2,631	130	11,299	593	14,653
<b>TOTAL</b>					
CONIFERS...	1,247,942	1,027,115	925,511	255,736	3,456,304
<b>TOTAL</b>					
HARDWOODS...	728,355	934,586	505,529	216,820	2,385,290
<b>TOTAL</b>					
ALL SPECIES	1,976,297	1,961,701	1,431,040	472,556	5,841,594



Hot pond — 130° F. — thaws logs — facilitates handling.

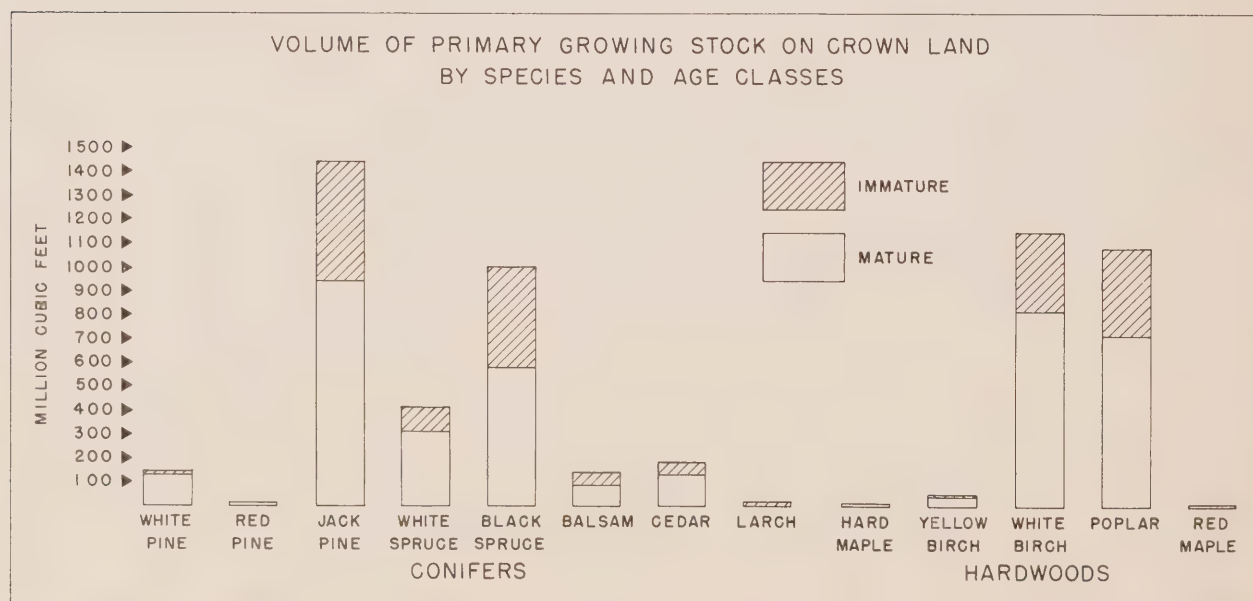
TABLE 9.—Cubic-foot volumes of primary growing stock on Crown land in the Chapleau district by species and age class in two size classes.

Species	Mature		Immature		Total Crown lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	3,432	125,054	3,835	10,369	142,690
Red pine.....	718	5,872	1,053	1,886	9,529
Jack pine.....	507,622	433,330	387,743	114,969	1,443,664
White spruce....	122,783	189,318	57,096	46,086	415,283
Black spruce....	447,969	131,061	386,763	41,034	1,006,827
Balsam fir.....	77,878	10,500	43,891	5,782	138,051
White cedar.....	36,958	92,386	21,058	31,990	182,392
Larch.....	2,330	115	11,017	581	14,043
TOTAL CONIFERS...	1,199,690	987,636	912,456	252,697	3,352,479
Hard maple.....	4,577	5,353	670	197	10,797
Yellow birch....	3,518	39,880	1,068	7,576	52,042
White birch.....	430,299	389,353	231,990	101,998	1,153,640
Poplar (all)....	258,829	457,178	261,571	104,479	1,082,057
Red maple.....	1,915	5,801	691	211	8,618
Ash.....	142	.....	54	46	242
TOTAL HARDWOODS...	699,280	897,565	496,044	214,507	2,307,396
TOTAL ALL SPECIES	1,898,970	1,885,201	1,408,500	467,204	5,659,875

TABLE 10.—Cubic-foot volumes of primary growing stock on patented lands in the Chapleau district by species and age class in two size classes.

Species	Mature		Immature		Total patented lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	.....	17	4	98	119
Red pine.....	.....	3	.....	.....	3
Jack pine.....	19,769	18,879	6,349	1,568	46,565
White spruce....	3,379	8,150	348	297	12,174
Black spruce....	18,974	7,324	5,438	688	32,424
Balsam fir.....	3,511	517	374	24	4,426
White cedar.....	2,318	4,574	260	352	7,504
Larch.....	301	15	282	12	610
TOTAL CONIFERS...	48,252	39,479	13,055	3,039	103,825
Hard maple.....	.....	.....	.....	.....	.....
Yellow birch....	.....	2	3	24	29
White birch.....	14,788	13,067	3,185	574	31,614
Poplar (all)....	14,286	23,952	6,294	1,715	46,247
Red maple.....	1	.....	3	.....	4
Ash.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS...	29,075	37,021	9,485	2,313	77,894
TOTAL ALL SPECIES	77,327	76,500	22,540	5,352	181,719

FIGURE 7



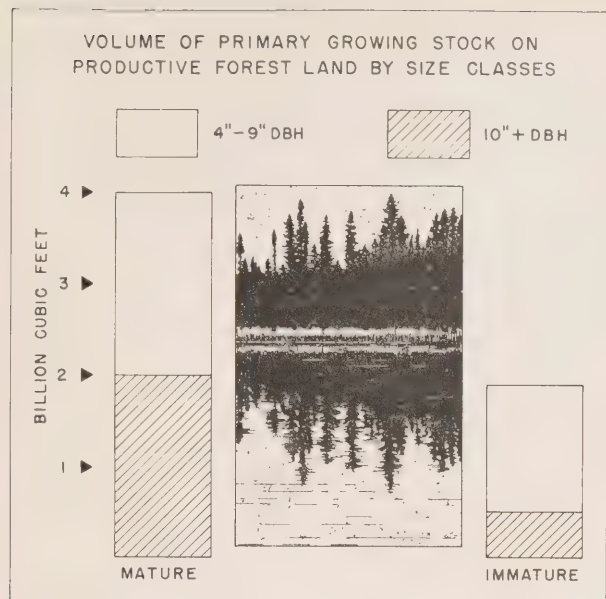


FIGURE 8

### *Sawlogs vs. Pulpwood*

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in the smaller size class are considered as mainly of value for pulpwood and cordwood material, depending on species, although poles, posts, railway ties and other products may be obtained from this size class. Volumes in the 10-inch and over size class have values for saw timber and other uses where larger timber is required. From a tree 10 inches d.b.h. outside bark, one sixteen foot log, 8 inches in diameter at the small end inside bark, can be obtained on the average. The residual smaller size material in the top may be diverted to uses other than saw timber. The residual volume is relatively small and is included with the volumes 10 inches d.b.h. and over in all inventory figures.

Of the volume of the primary growing stock on productive forest land 3.4 billion cubic feet are in the 4-9 inch class and 2.4 billion cubic feet in the 10 inch and over class (table 8). Considering only the coniferous species, 63 per cent of the volume is in the smaller size class. The volume of the hardwood species has an almost even distribution with 52 per cent in the smaller size class and 48 per cent

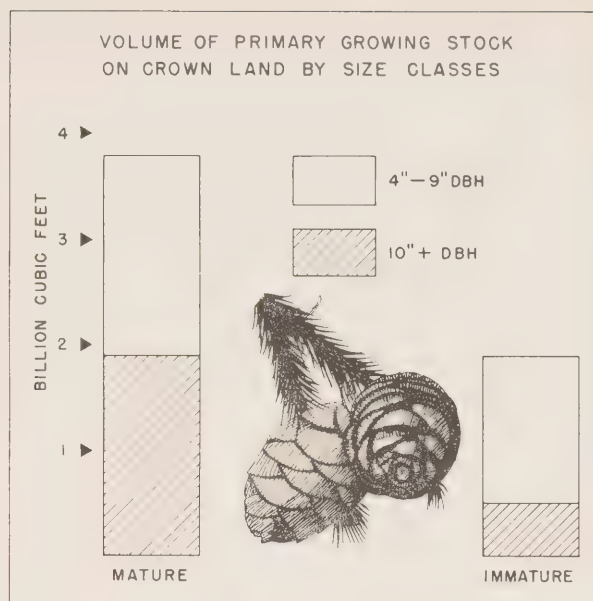
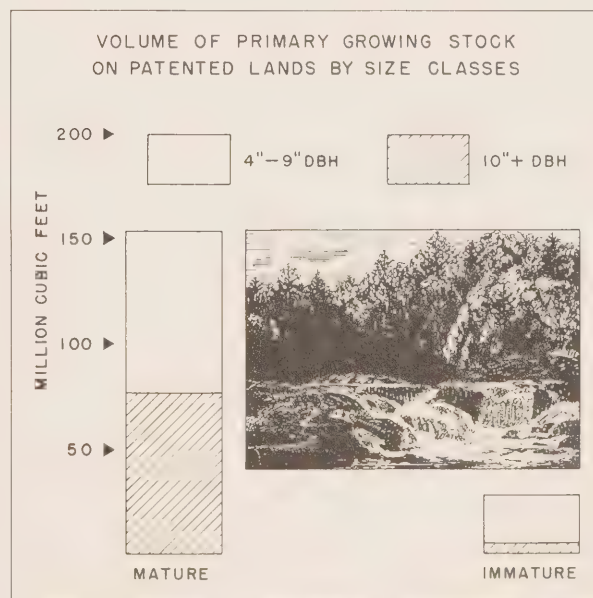


FIGURE 9

in the larger class. In the mature age class on productive forest lands 1,976 million cubic feet are in the 4-9 inch size class and 1,962 million cubic feet are in the larger size class (fig. 8). If only the conifers are considered, 55 per cent of the volume is in the smaller size class and 45 per cent

FIGURE 10







*Giant roller flattens snow on lake, reduces insulation, inducing thick ice to support huge log dumps.*

in the larger. With hardwoods the reverse is true, 56 per cent of the volume lying in the sawlog size class and 44 per cent in the pulpwood class.

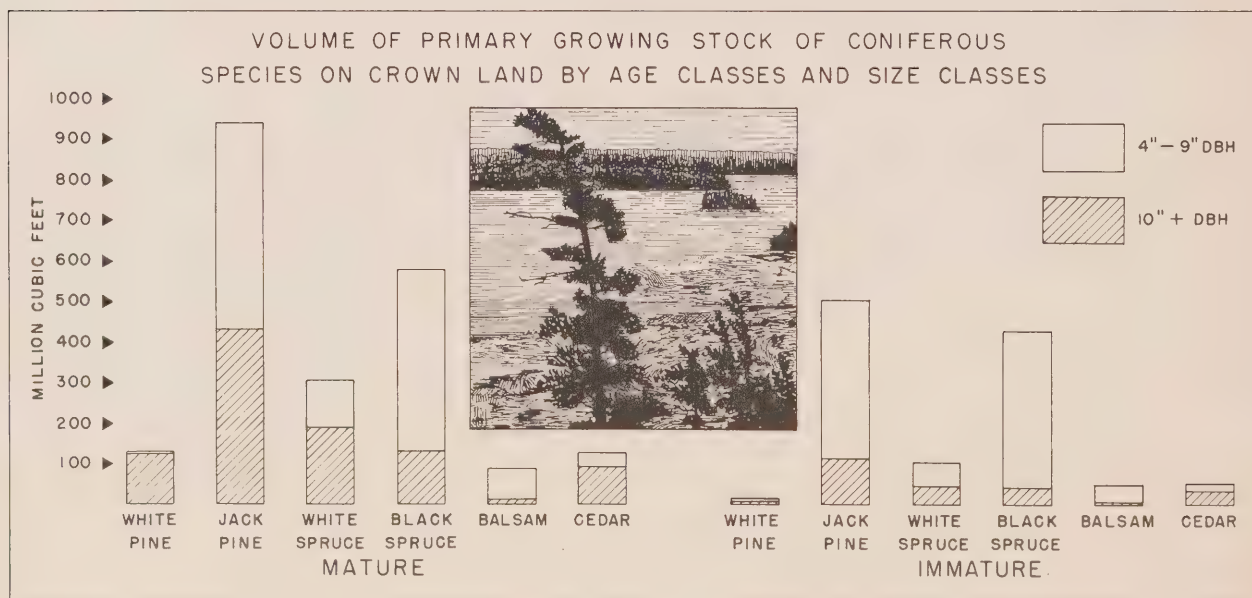
On Crown lands, 3,307 million cubic feet or 58

per cent of the volume is in the 4-9 inch class and 2,352 million cubic feet or 42 per cent is in the 10 inch and over class (table 9). If the species groups are considered separately, the pulpwood size class contains 63 per cent of the coniferous, and 52 per cent of the hardwood volume. An examination of the two age classes shows that the mature age class is evenly divided between the two diameter classes (fig. 9), while the immature age class has 75 per cent of its volume in the smaller size class.

Patented lands cover a small percentage of the district and produce only 182 million cubic feet (table 10). Of this volume, 55 per cent is in the 4-9 inch class and 45 per cent in the 10 inch and over class. Conifers have 59 per cent of their volume in the pulpwood class, while hardwoods are evenly divided between the two classes. The mature forest has 50 per cent of the volume in each size class (fig. 10), while the immature has 81 per cent of its volume in the smaller size class.

The volume relationship of the two size classes for the principal coniferous species on Crown lands in mature and immature forest is shown in figure 11. White pine has 97 per cent of its mature volume, and 73 per cent of the immature, in the sawlog size class. White cedar, in both age classes, has over 60 per cent of the volume in the larger size class. White spruce, with 61 per cent of the mature and

FIGURE 11



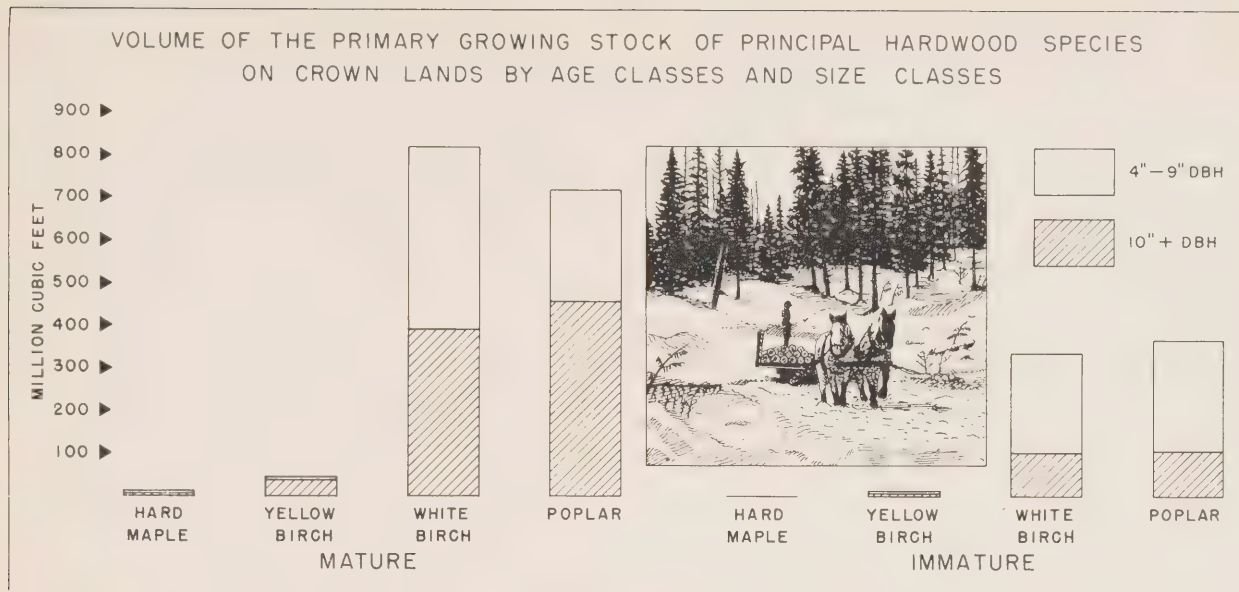


FIGURE 12

44 per cent of the immature volume in the 10 inch and over class, produces a considerable proportion of sawlogs. The remaining coniferous species produce primarily pulpwood material. Jack pine has 54 per cent of the mature and 77 per cent of the immature volume in this size class. Black spruce, with 77 per cent of the mature and 90 per cent of the immature volume in the 4-9 inch class, is predominantly a pulpwood producer. Balsam fir has 88 per cent of the volume of both age classes in the smaller size class.

The size relationships of the main hardwood species on Crown land are shown in figure 12. It is evident that poplar and white birch are the principal hardwood species within the district. White birch, the more persistent of the two, occupies the more important position in the mature forest, but has a somewhat smaller volume than poplar in the immature class. White birch has 53 per cent of the mature volume, and 69 per cent of the immature, in the 4-9 inch size class. Poplar has 64 per cent of the mature volume in the sawlog size class and 71 per cent of the immature volume in the cordwood size class.

Patented lands, covering only 3 per cent of the forested area, have 85 per cent of their volume in the mature age class. The size class distribution of the mature timber by species is shown in figure 13.

### Allowable Cut

The allowable cut has been computed for each species with the aid of a volumetric formula<sup>1</sup> and appropriate rotation<sup>2</sup> for species. Thus the amount of allowable cut results from the volume of the



Logs stacked at Flame Lake Camp.

<sup>1</sup> Method of calculation of allowable cut is given in Appendix, methods, allowable cut, page 27.

<sup>2</sup> Rotation by species, table 16, page 27.





*Direct action: from forest to log boom by truck.*

primary growing stock and the rotation adopted for each species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may appear on areas which at the moment are inaccessible to operations or which

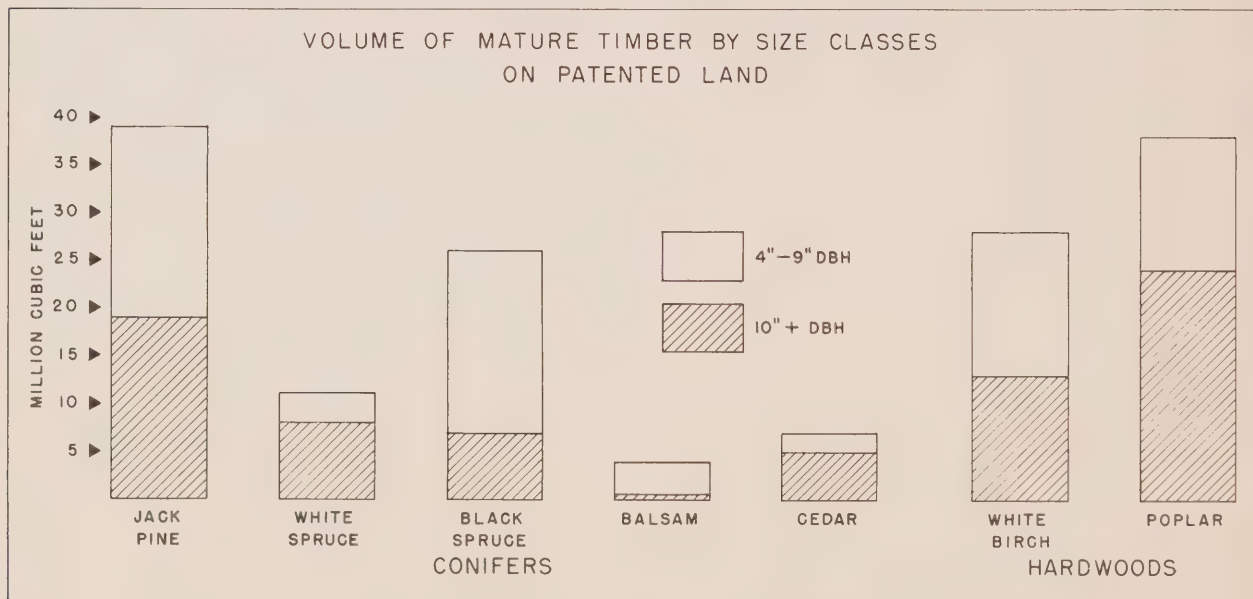
are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential, rather than actually available under present operating conditions.

The calculation of allowable cut, based on the present volume of the primary growing stock, is of value for a period of about ten years. This is because of woods operations being carried out and the present stands growing in volume each year. Therefore, the size and structure of the primary growing stock, regarded as the foundation of the allowable cut calculations, changes also from year to year, and for that reason, on expiration of the initial ten year period, the allowable cut should be calculated anew. With effective forestry practices, allowable cuts for the valuable species will increase; without them the present trend to more poplar and white birch may continue.

Patented lands in the district are for the most part held by the companies, and it is expected that timber on these lands will be managed in the same way as on Crown lands. Therefore, no distinction of rotations for Crown or patented lands has been made.

The annual allowable cut or net depletion allowable under management in the Chapleau district is 92,068,265 cubic feet; 89,263,615 cubic feet from Crown lands and 2,804,650 cubic feet from patented lands. Of the total allowable cut, 97 per cent is on Crown lands and 3 per cent on patented lands.

FIGURE 13





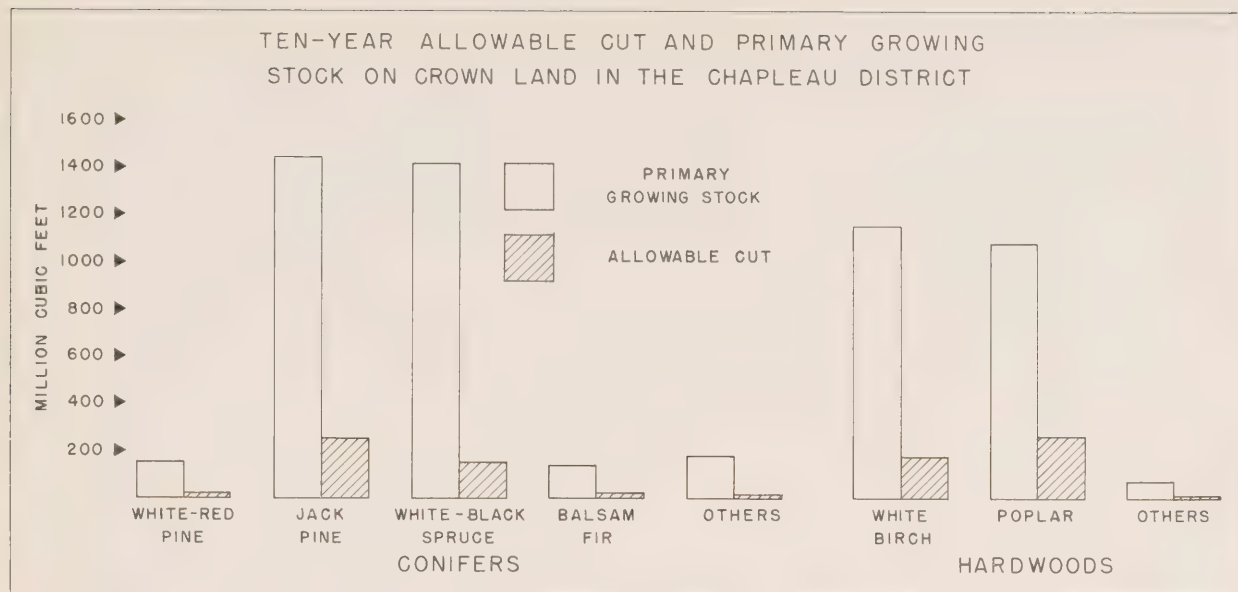


FIGURE 14

#### CROWN LAND

The annual allowable cut for Crown lands represents 1.6 per cent of the primary growing stock or 27.6 cubic feet per acre of the productive forest area. Of the total allowable cut, approximately one half of the volume is coniferous species and the other half is hardwoods. Since the rotation is on the average longer for conifers than for poplar and white birch, the annual allowable cut for conifers is 1.3 per cent of the coniferous primary growing stock and 1.9 per cent for the hardwoods.

The annual allowable cut for species making up the coniferous content (table 11) shows that 56 per cent is jack pine, 11 per cent white spruce, 23 per cent black spruce, 4 per cent balsam fir, 3 per cent white and red pine and 3 per cent other conifers. The relationship of the allowable cut for a ten-year period to the volume of the coniferous primary

growing stock by species is shown graphically, figure 14.

The species making up the hardwood content (table 12) show that 59 per cent is poplar, 39 per cent is white birch and 2 per cent other hardwoods. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods is shown graphically, figure 14.

TABLE 12. — *Annual allowable cut for hardwood species on Crown lands.*

Species	Annual allowable cut cu. ft.
Hard maple.....	65,450
Yellow birch.....	420,630
White birch.....	17,483,420
Poplar.....	26,237,690
Red maple.....	149,265
Ash, white and black.....	2,935
<b>TOTAL HARDWOODS.....</b>	<b>44,359,390</b>

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Chapleau district.*

Species	Annual allowable cut cu. ft.
White pine.....	1,441,640
Red pine.....	115,525
Jack pine.....	25,004,255
White spruce.....	5,034,885
Black spruce.....	10,172,295
Balsam fir.....	1,859,700
White cedar.....	1,105,660
Larch.....	170,265
<b>TOTAL CONIFERS.....</b>	<b>44,904,225</b>

#### PATENTED LAND

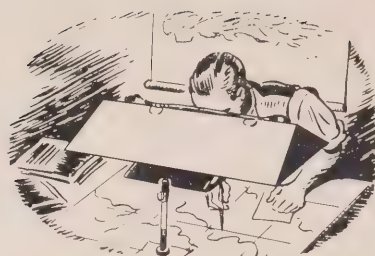
The annual allowable cut for patented lands amounts to 2,804,650 cubic feet, which represents 1.5 per cent of the primary growing stock or 30.8 cubic feet per acre of the productive forest land. The annual allowable cut on patented lands is 1.3 per cent of the coniferous primary growing stock and 1.9 per cent for the hardwoods.

The annual allowable cut for coniferous species on patented lands is 1,306,195 cubic feet and for

hardwoods, 1,498,455. Jack pine is the most important conifer making up 58 per cent of the coniferous allowable cut, black spruce comes second with 23 per cent and white spruce supplies 11 per cent. Minor conifers including balsam fir, white and red pine, white cedar and larch account for only 8 per cent of the coniferous allowable cut on patented lands (table 13, fig. 15). The only important hardwood species are poplar and white birch. Poplar makes up 70 per cent of the total hardwood allowable cut and white birch 30 per cent. Yellow birch and maple are present in inappreciable volumes.

TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut cu. ft.
White pine.....	1,130
Red pine .....	40
Jack pine.....	754,915
White spruce.....	138,150
Black spruce.....	306,665
Balsam fir.....	55,805
White cedar.....	42,580
Larch.....	6,910
<b>TOTAL CONIFERS.....</b>	<b>1,306,195</b>
Yellow birch.....	220
White birch .....	448,450
Poplar.....	1,049,715
Red maple .....	70
<b>TOTAL HARDWOODS.....</b>	<b>1,498,455</b>
<b>TOTAL.....</b>	<b>2,804,650</b>



### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Returns<sup>1</sup> for the period 1947-1949 inclusive, wood and forest products were cut on Crown lands in the Chapleau district as follows:

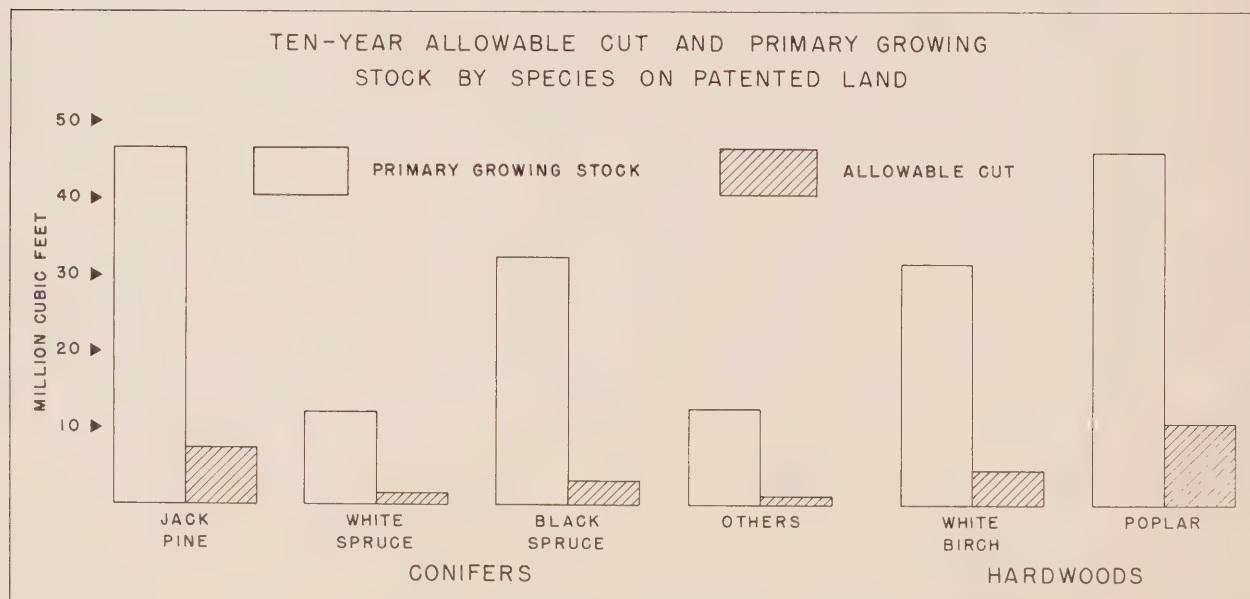
Logs and booms.....	7,361,254 F.B.M. Doyle rule
Poles.....	15,262 pieces
Car stakes.....	4,118 pieces
Pulpwood .....	53,578 cords
Fuelwood .....	110 cords

By the use of appropriate converting factors, these amounts are expressed in gross total cubic feet (table 14) and are comparable with the figures for allowable cut.

The total volume of wood utilized in the Chapleau district is 11 million cubic feet, 9 million cubic feet or 82 per cent is jack pine, 1.7 million cubic feet or 15 per cent is spruce and the balance of

<sup>1</sup> Reports of the Minister of Lands and Forests, for the Province of Ontario, for the fiscal years ending March 31, 1948-1950.

FIGURE 15



3 per cent is made up of poplar 2 per cent and white and red pine one per cent (table 14).

A comparison of the annual allowable cut with the actual utilization by species (table 15) shows that out of an allowable cut of 89,264 thousand cubic feet only 11,324 thousand cubic feet or 13 per cent is utilized for the Chapleau district. The allowable cut is made up of equal volumes of conifers and hardwoods in contrast to the actual cut which is 98 per cent conifers and 2 per cent hardwoods. Jack pine, the most important conifer in the Chap-

TABLE 14. — *Gross total cubic volume of wood utilized annually in the Chapleau district.*

Species	Wood utilized cu. ft.	Total per cent
Pine, white and red.....	161,790	1
Jack pine.....	9,227,172	82
Spruce, white and black.....	1,667,677	15
Balsam fir.....	30,803	
Cedar.....	284	
<b>TOTAL CONIFERS.....</b>	<b>11,087,726</b>	<b>98</b>
White birch.....	24,173	
Poplar.....	212,346	2
<b>TOTAL HARDWOODS.....</b>	<b>236,519</b>	<b>2</b>
<b>TOTAL.....</b>	<b>11,324,245</b>	<b>100</b>

leau district, makes up 56 per cent of the coniferous allowable and 82 per cent of the actual cut. Black and white spruce, making up 34 per cent of the

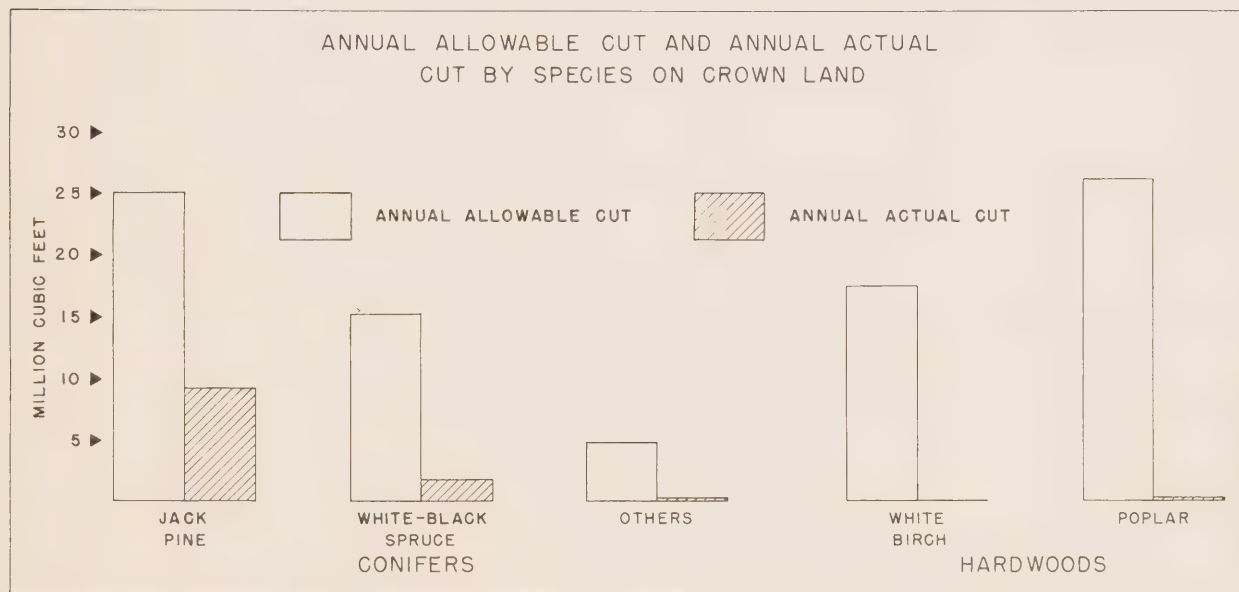
coniferous allowable cut, comprises 15 per cent of the actual utilization. Generally for the Chapleau district 25 per cent of the coniferous allowable cut is being utilized and less than one per cent for the hardwoods, leaving large volumes of both species groups unutilized in the district (fig. 16).

TABLE 15. — *Comparison of allowable cut with actual utilization by species.*

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red .....	1,557	162
Jack pine .....	25,004	9,227
Spruce, white and black .....	15,207	1,668
Balsam fir.....	1,860	31
White cedar...	1,106	
Larch .....	170	
<b>TOTAL CONIFERS....</b>	<b>44,904</b>	<b>11,088</b>
Hard maple .....	65	
Yellow birch .....	421	
White birch .....	17,484	24
Poplar (all).....	26,238	212
Red maple.....	149	
Ash, white and black..	3	
<b>TOTAL HARDWOODS.</b>	<b>44,360</b>	<b>236</b>
<b>TOTAL.....</b>	<b>89,264</b>	<b>11,324</b>

There are no available records of the amount of wood cut from patented lands in the Chapleau district, and comparisons of allowable with actual cuts cannot be made.

FIGURE 16





# APPENDIX



## *Survey Methods*

● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15,840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Photography was carried out during the years of 1946 and 1949 and field work during the summer of 1951, when all data necessary for the making of volume estimates were collected. On completion of the field work, finished forest type maps were prepared and areas determined by the usual methods.<sup>1</sup>

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for the two ecological sections in the Chapleau district. The per acre volumes in cubic feet, made up in this manner, are shown in tables 18 and 19 for the Central Transition section. No table is included for the Timagami section,

which comprises the relatively small area of four townships. This table may be found in report number eleven dealing with the Sault Ste. Marie district.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the Chapleau district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Chapleau district are shown in figure 17.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 28 cubic feet per acre, and for patented land, 31 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

## *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range

<sup>1</sup> A complete statement of the methods used in the forest resources inventory is contained in the Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

from 10 to 100 years, the mature age class from 30 to 200 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

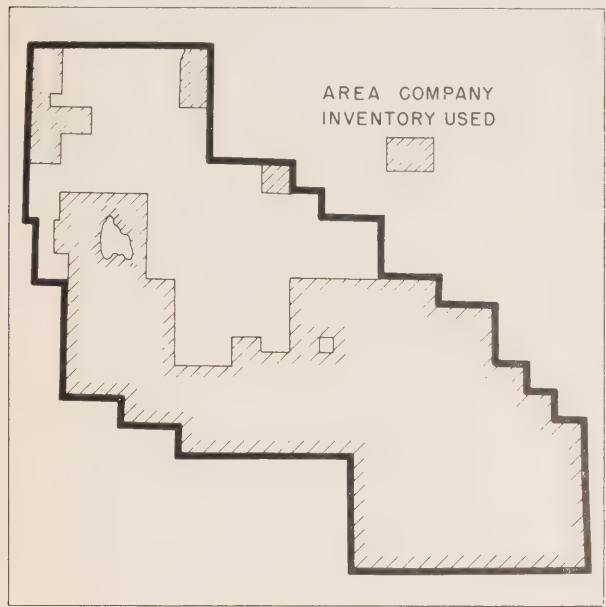


FIGURE 17

Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class 1b<sup>1</sup>

TABLE 16. — Rotation by species.

Species	Crown and patented lands years
White pine.....	120
Red pine.....	100
Jack pine.....	70
White spruce.....	100
Black spruce.....	120
Balsam fir.....	90
White cedar.....	200
Larch.....	100
Hard maple.....	200
Yellow birch.....	150
White birch.....	80
Poplar.....	50
Red maple.....	70
White and black ash.....	100

were used as rotation ages for each species encountered except jack pine where a rotation of 70 years has been accepted as more suitable than that of 60 years. The rotation age of 100 years for ash has been adopted arbitrarily (table 16).

<sup>1</sup> Manual of Timber Management, Dept. of Lands and Forests, Ontario — Part II, page 50.

Allowable Cut

(a) METHOD

The following two bases were available for calculation of allowable cut: 1. the volumes of the mature and immature age classes for each species, and 2. the adopted rotations.

The compilation was carried out in such a way that the volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary growing stock in the district, and the method of calculation most suitable to the available data is by a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory for the following reasons: 1. The ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 as required by the French method; 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same; 3. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

(b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5 \cdot 8 (V.1. + V.2.)}{n \cdot 3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I)
- V.2. — denotes volume of immature timber (Age Class II)
- n — denotes rotation
- P — denotes annual allowable cut

By application of this formula, the following figures for the annual allowable cut were obtained:

Crown lands	138,048,005 cubic feet
Patented lands	4,633,760 cubic feet
TOTAL	142,681,765 cubic feet

This may be regarded as the maximum annual allowable cut for the district, fully justified if need of intensive utilization was substantiated by the

<sup>1</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930. Paris.

present operations in the district. As may be seen from table 14, the annual volume actually utilized was only 11,324,245 cubic feet, or eight per cent of the 138,048,005 cubic feet maximum annual allowable cut on Crown lands in the Chapleau district.

With rather a moderate demand on wood in view, and with a substantial accumulation of mature timber in the district, an advantageous opportunity arises where, by means of a normal and not the maximum utilization, the normal size of age classes may be obtained. In this way a sound foundation would be created for a balanced sustained yield in the future.

During the period of a gradual normalization of age class areas, a portion of mature and over-mature stands will be held over and above their mature age. This involves certain losses in volume of those stands, where growing cull may not be balanced by volume increment of ageing stands. However, these losses are not expected to be of importance.

In view of the foregoing, the calculations of the annual allowable cut for Crown lands, carried out on the French method principles, were brought down to the normal level, according to the following procedure:

— Productive forest area = 3,234,571 acres  
 — Age Class I volume per acre = 2,124.97 cubic feet  
 — Mean annual increment to the rotation age = 27.62 cubic feet  

$$\text{Average rotation} = \frac{2,124.97}{27.62} = 77 \text{ years}$$
  

$$\text{Thus the normal area allotment} = \frac{3,234,571}{77} = 42,007 \text{ acres}$$
  
 Annual allowable cut = 42,007 x 2,124.97 = 89,263,615 cubic feet

The calculations of the annual allowable cut for the patented lands, carried out also on the French method principles, were reduced to the normal level as follows:

— Productive forest area = 91,168 acres  
 — Age Class I volume per acre = 2,276.50 cubic feet  
 — Mean annual increment to the rotation age = 30.81 cubic feet  

$$\text{Average rotation} = \frac{2,276.50}{30.81} = 74 \text{ years}$$
  

$$\text{Thus the normal area allotment} = \frac{91,168}{74} = 1,232 \text{ acres}$$
  
 Annual allowable cut = 1,232 x 2,276.50 = 2,804,650 cubic feet

Thus the total annual allowable cut for the Chapleau district is:

Crown lands..	.. 89,263,615 cubic feet
Patented lands..	.. 2,804,650 cubic feet
TOTAL	.. 92,068,265 cubic feet

## Cull Factor

Where it was found necessary either to calculate net merchantable volume or to calculate the volume of the primary growing stock, when merchantable volumes only were given in company reports, the appropriate cull factors (table 17) were used throughout. These cull factors were taken from the figures for defect, made available from operations being carried out in the district.

TABLE 17. — Cull factors by species, Chapleau district.

Species	Cull per cent
White pine.....	16
Red pine.....	16
Jack pine.....	20
White spruce.....	12
Black spruce.....	12
Balsam fir.....	37
White cedar.....	45
White birch.....	25
Poplar.....	29



## Common and Botanical Names of Tree Species included in Timber Estimates

### CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill.) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

### HARDWOODS

Hard maple.....	<i>Acer saccharum</i> Marsh.
Yellow birch.....	<i>Betula lutea</i> Michx. f.
Red maple.....	<i>Acer rubrum</i> L.
White ash.....	<i>Fraxinus americana</i> L.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.



TABLE 18. — *Volume of the primary growing stock in cubic feet per acre.*  
Central Transition Section — 1948

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	3.3 160.6	3.2 159.0	3.1 149.7	4.5 220.4	..... .....	..... .....	..... .....	..... .....
Red pine.....	4"-9" 10" up	5.3 61.2	5.3 60.5	5.0 57.0	..... .....	..... .....	..... .....	..... .....	..... .....
Jack pine.....	4"-9" 10" up	372.9 372.9	369.0 368.9	347.7 347.8	108.3 342.9	618.6 61.2	609.2 60.3	564.2 55.8	199.5 24.7
White spruce.....	4"-9" 10" up	53.8 74.4	53.3 73.6	50.2 69.4	72.0 72.1	45.1 14.3	44.5 14.0	41.2 13.0	44.9 21.1
Black spruce.....	4"-9" 10" up	654.5 134.0	647.6 132.6	610.4 125.0	226.5 88.1	601.9 31.7	592.8 31.2	549.0 28.9	255.7 41.6
Balsam fir.....	4"-9" 10" up	75.6 7.5	74.8 7.4	70.5 7.0	51.1 3.3	60.1 5.9	59.2 5.8	54.8 5.4	46.1 .....
White cedar.....	4" 9" 10" up	89.3 145.8	88.4 144.2	83.3 136.0	52.4 75.5	23.0 16.6	22.6 16.4	20.9 15.2	104.7 18.5
Larch.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	28.2 1.5	27.8 1.5	25.7 1.4	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	1254.7 956.4	1241.6 946.2	1170.2 891.9	514.8 802.3	1376.9 131.2	1356.1 129.2	1255.8 119.7	650.9 105.9
White birch.....	4"-9" 10" up	56.7 50.2	56.1 49.7	52.8 46.9	49.5 84.3	62.1 25.4	61.1 25.0	56.7 23.1	17.6 20.6
Poplar (all).....	4"-9" 10" up	20.5 36.5	20.3 36.1	19.2 34.0	8.0 11.1	34.3 20.1	33.8 19.8	31.3 18.4	..... .....
TOTAL HARDWOODS.....	4"-9" 10" up	77.2 86.7	76.4 85.8	72.0 80.9	57.5 95.4	96.4 45.5	94.9 44.8	88.0 41.5	17.6 20.6
GRAND TOTAL.....	4"-9" 10" up	1331.9 1043.1	1318.0 1032.0	1242.2 972.8	572.3 897.7	1473.3 176.7	1451.0 174.0	1343.8 161.2	668.5 126.5
TOTAL 4" UP.....		2375.0	2350.0	2215.0	1470.0	1650.0	1625.0	1505.0	795.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	23.8 53.1	22.6 50.3	19.4 43.2	..... .....	48.8 76.2	44.1 68.9	33.9 53.1	..... .....
White spruce.....	4"-9" 10" up	53.3 60.2	50.6 57.0	43.4 49.0	..... .....	21.0 14.0	19.0 12.6	14.6 9.8	..... .....
Black spruce.....	4"-9" 10" up	27.4 9.2	26.0 8.7	22.4 7.4	..... .....	23.7 3.8	21.4 3.5	16.4 2.7	20.7 .....
Balsam fir.....	4" 9" 10" up	27.1 9.5	25.7 9.0	22.1 7.7	24.5 .....	27.9 2.1	25.2 1.9	19.4 1.5	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	131.6 132.0	124.9 125.0	107.3 107.3	24.5 .....	121.4 96.1	109.7 86.9	84.3 67.1	20.7 .....
White birch.....	4"-9" 10" up	553.1 285.0	524.4 270.2	450.4 232.0	325.7 554.6	483.8 106.2	437.4 96.0	336.7 73.9	185.8 14.0
Poplar (all).....	4"-9" 10" up	639.6 1918.7	606.4 1819.1	520.8 1562.2	240.9 536.1	1337.1 355.4	1208.7 321.3	930.6 247.4	543.6 135.9
Red maple.....	4" 9" 10" up	..... .....	..... .....	..... .....	68.2 .....	..... .....	..... .....	..... .....	..... .....
TOTAL HARDWOODS.....	4"-9" 10" up	1192.7 2203.7	1130.8 2089.3	971.2 1794.2	634.8 1090.7	1820.9 461.6	1646.1 417.3	1267.3 321.3	729.4 149.9
GRAND TOTAL.....	4" 9" 10" up	1324.3 2335.7	1255.7 2214.3	1078.5 1901.5	659.3 1090.7	1942.3 557.7	1755.8 504.2	1351.6 388.4	750.1 149.9
TOTAL 4" UP.....		3660.0	3470.0	2980.0	1750.0	2500.0	2260.0	1740.0	900.0

(Continued on page 30)

TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	5.9 189.2	5.6 182.2	5.2 168.5	..... 433.2	1.5 12.0	1.4 11.1	1.1 8.9	.....
Red pine.....	4"-9" 10" up	0.4 36.2	0.4 34.8	0.3 32.3	.....	.....	.....	.....	.....
Jack pine.....	4"-9" 10" up	167.5 311.0	161.2 299.4	149.1 277.0	.....	279.3 164.0	259.4 152.3	206.9 121.5	72.6 42.6
White spruce.....	4"-9" 10" up	95.5 169.7	91.9 163.4	85.0 151.1	44.8 234.9	103.9 55.9	96.5 51.9	77.0 41.4	51.5 30.2
Black spruce.....	4"-9" 10" up	138.0 51.0	132.8 49.1	122.9 45.4	21.6 64.6	215.8 11.4	200.5 10.6	160.0 8.4	80.6 13.1
Balsam fir.....	4"-9" 10" up	103.8 21.2	99.8 20.5	92.4 18.9	130.2 21.2	94.1 7.1	87.5 6.6	69.8 5.2	40.4 3.5
White cedar.....	4"-9" 10" up	18.5 39.4	17.8 37.9	16.5 35.1	41.9 132.6	10.3 7.7	9.5 7.2	7.6 5.7	.....
TOTAL CONIFERS.....	4"-9" 10" up	529.6 817.7	509.5 787.3	471.4 728.3	238.5 886.5	704.9 258.1	654.8 239.7	522.4 191.1	245.1 89.4
Yellow birch.....	4"-9" 10" up	6.9 38.8	6.6 37.4	6.1 34.6	.....	.....	.....	.....	.....
White birch.....	4"-9" 10" up	452.5 254.6	435.6 245.1	402.9 226.7	254.1 381.1	480.1 91.4	446.0 84.9	355.7 67.7	197.6 88.8
Poplar (all).....	4"-9" 10" up	237.0 710.9	228.1 684.4	211.0 633.0	181.7 161.1	515.2 200.3	478.5 186.1	381.7 148.4	165.0 74.1
TOTAL HARDWOODS.....	4"-9" 10" up	696.4 1004.3	670.3 966.9	620.0 894.3	435.8 542.2	995.3 291.7	924.5 271.0	737.4 216.1	362.6 162.9
GRAND TOTAL.....	4"-9" 10" up	1226.0 1822.0	1179.8 1754.2	1091.4 1622.6	674.3 1428.7	1700.2 549.8	1579.3 510.7	1259.8 407.2	607.7 252.3
TOTAL 4" UP.....		3048.0	2934.0	2714.0	2103.0	2250.0	2090.0	1667.0	860.0



TABLE 19. — *Volume of the primary growing stock in cubic feet per acre.*  
*Central Transition Section — 1951*

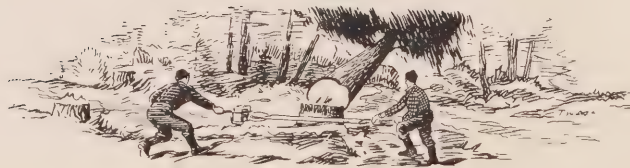
SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	670.9 549.0	646.0 528.6	488.6 399.7	16.7 87.4	648.2 139.4	630.3 135.6	554.0 119.1	245.1 52.7
White spruce.....	4"-9" 10" up	37.4 51.4	36.0 49.5	27.2 37.5	81.0 132.2	17.1 10.8	16.6 10.5	14.6 9.2	6.5 4.1
Black spruce.....	4"-9" 10" up	812.0 248.0	781.9 238.8	591.2 180.6	42.0 79.8	759.4 88.1	738.4 85.7	648.9 75.3	287.2 33.3
Balsam fir.....	4"-9" 10" up	44.8 5.5	43.2 5.3	32.7 4.0	94.7 .....	19.2 0.7	18.7 0.7	16.4 0.6	7.2 0.3
White cedar.....	4"-9" 10" up	98.6 147.2	94.9 141.7	71.8 107.2	36.4 175.1	36.6 43.2	35.6 42.0	31.3 36.9	13.9 16.3
Larch.....	4"-9" 10" up	17.0 0.8	16.3 0.8	12.3 0.6	.....	46.0 1.9	44.6 1.9	39.3 1.6	17.4 0.7
TOTAL CONIFERS.....	4"-9" 10" up	1680.7 1001.9	1618.3 964.7	1223.8 729.6	270.8 474.5	1526.5 284.1	1484.2 276.4	1304.5 242.7	577.3 107.4
White birch.....	4"-9" 10" up	94.5 38.8	91.0 37.3	68.8 28.2	41.9 50.3	78.9 10.8	76.8 10.5	67.5 9.2	29.8 4.1
Poplar (all).....	4"-9" 10" up	53.8 91.3	51.8 87.9	39.2 66.4	8.5 .....	64.6 29.1	62.8 28.3	55.2 24.9	24.4 11.0
TOTAL HARDWOODS.....	4"-9" 10" up	148.3 130.1	142.8 125.2	108.0 94.6	50.4 50.3	143.5 39.9	139.6 38.8	122.7 34.1	54.2 15.1
GRAND TOTAL.....	4"-9" 10" up	1829.0 1132.0	1761.1 1089.9	1331.8 824.2	321.2 524.8	1670.0 324.0	1623.8 315.2	1427.2 276.8	631.5 122.5
TOTAL 4" UP.....		2961.0	2851.0	2156.0	846.0	1994.0	1939.0	1704.0	754.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	59.8 88.3	58.4 86.1	48.7 71.8	.....	94.7 75.6	86.9 69.4	60.0 47.9	22.2 17.7
White spruce.....	4"-9" 10" up	26.7 68.1	26.1 66.4	21.8 55.4	40.2 239.0	19.1 27.7	17.6 25.4	12.1 17.6	4.5 6.5
Black spruce.....	4"-9" 10" up	33.3 11.1	32.5 10.9	27.1 9.1	109.8 32.1	19.4 4.0	17.9 3.6	12.3 2.5	4.6 0.9
Balsam fir.....	4"-9" 10" up	39.1 5.3	38.2 5.2	31.9 4.3	4.5 .....	25.5 2.2	23.4 2.0	16.1 1.4	6.0 0.5
White cedar.....	4"-9" 10" up	3.0 8.8	2.9 8.7	2.4 7.2	.....	0.6 1.6	0.5 1.5	0.4 1.0	0.1 0.4
TOTAL CONIFERS.....	4"-9" 10" up	161.9 181.6	158.1 177.3	131.9 147.8	154.5 271.1	159.3 111.1	146.3 101.9	100.9 70.4	37.4 26.0
White birch.....	4"-9" 10" up	485.6 307.9	474.2 300.6	395.4 250.7	229.2 423.9	473.6 54.4	434.7 49.9	300.1 34.5	111.0 12.7
Poplar (all).....	4"-9" 10" up	881.0 943.0	860.1 920.7	717.4 767.8	47.3 .....	1107.1 223.5	1016.0 205.2	701.5 141.6	259.5 52.4
TOTAL HARDWOODS.....	4"-9" 10" up	1366.6 1250.9	1334.3 1221.3	1112.8 1018.5	276.5 423.9	1580.7 277.9	1450.7 255.1	1001.6 176.1	370.5 65.1
GRAND TOTAL.....	4" 9" 10" up	1528.5 1432.5	1492.4 1398.6	1244.7 1166.3	431.0 695.0	1740.0 389.0	1597.0 357.0	1102.5 246.5	407.9 91.1
TOTAL 4" UP.....		2961.0	2891.0	2411.0	1126.0	2129.0	1954.0	1349.0	499.0

(Continued on page 32)



TABLE 19 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	0.8 28.0	0.8 25.5	0.6 19.6	.....
Jack pine.....	4"-9" 10" up	282.2 319.4	256.8 290.8	203.4 230.2	8.6 24.3	592.2 124.8	541.6 114.1	415.6 87.6	.....
White spruce.....	4"-9" 10" up	83.5 208.3	76.0 189.6	60.1 150.2	58.7 245.6	33.8 33.3	30.9 30.5	23.7 23.4	6.8 9.3
Black spruce.....	4"-9" 10" up	154.5 86.1	140.6 78.4	111.3 62.1	44.4 101.6	163.0 21.6	149.1 19.8	114.4 15.2	108.3 104.5
Balsam fir.....	4"-9" 10" up	87.6 14.7	79.7 13.4	63.1 10.6	21.6	31.0 2.6	28.3 2.4	21.8 1.8	25.9
White cedar.....	4"-9" 10" up	18.3 56.9	16.6 51.9	13.2 41.0	6.8 51.8	5.5 11.3	5.0 10.3	3.8 8.0	20.3 73.5
Larch.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	2.8
TOTAL CONIFERS.....	4"-9" 10" up	626.1 685.4	569.7 624.1	451.1 494.1	140.1 423.3	826.3 221.6	755.7 202.6	579.9 155.6	164.1 187.3
Yellow birch.....	4" 9" 10" up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	4.1 40.0
White birch.....	4"-9" 10" up	372.7 355.2	339.3 323.3	268.6 256.1	124.8 253.5	308.0 70.9	281.7 64.8	216.2 49.7	94.8 76.7
Poplar (all).....	4"-9" 10" up	325.4 643.2	296.2 585.4	234.6 463.5	16.9 69.4	738.1 233.1	675.0 213.2	518.0 163.6	104.3 23.1
Red maple.....	4" 9" 10" up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	5.6
TOTAL HARDWOODS.....	4"-9" 10" up	698.1 998.4	635.5 908.7	503.2 719.6	141.7 322.9	1046.1 304.0	956.7 278.0	734.2 213.3	208.8 139.8
GRAND TOTAL.....	4"-9" 10" up	1324.2 1683.8	1205.2 1532.8	954.3 1213.7	281.8 746.2	1872.4 525.6	1712.4 480.6	1314.1 368.9	372.9 327.1
TOTAL 4" UP.....		3008.0	2738.0	2168.0	1028.0	2398.0	2193.0	1683.0	700.0







**Hon. Welland S. Gemmell**

*Minister*

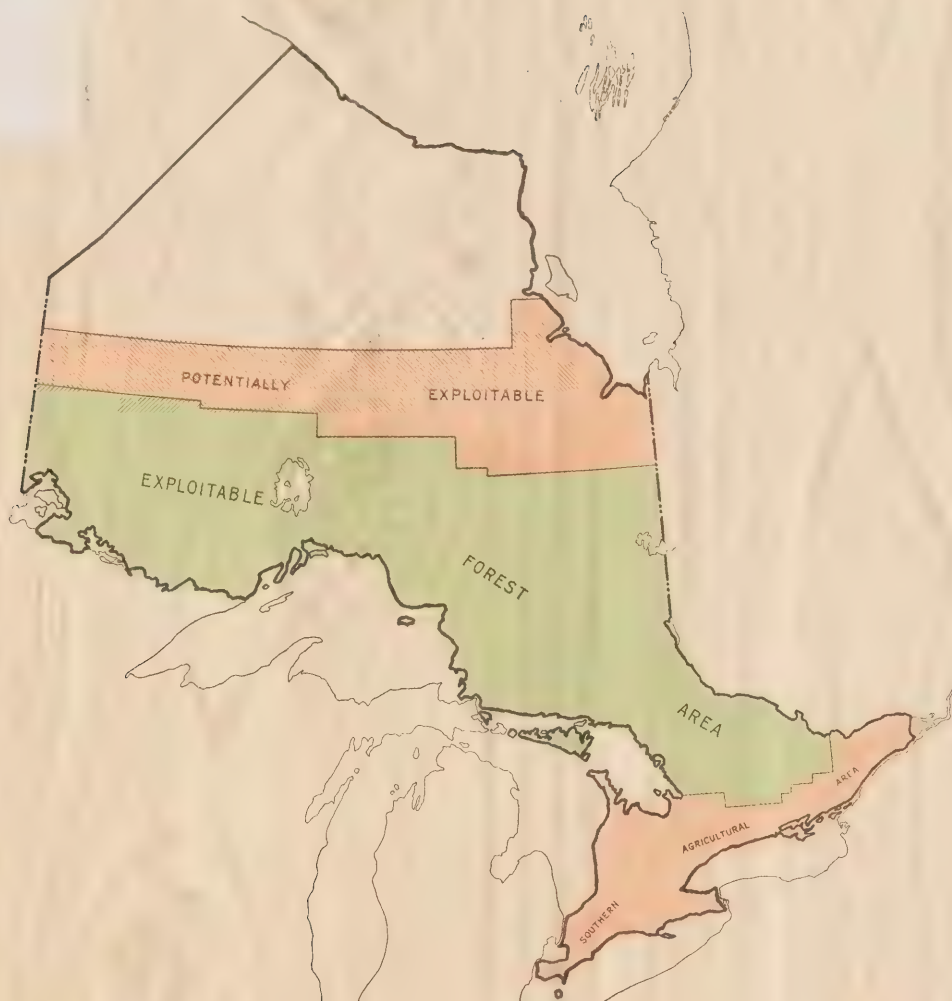
**F. A. MacDougall**

*Deputy Minister*



Report No. 13 of the  
**GOGAMA DISTRICT**

CA20N  
LF  
-F56



# *Forest Resources Inventory*

—1953—

Division of Timber Management

Ontario Department of Lands and Forests



# *Forest Resources Inventory*

— 1953 —

Report No. 13 of the  
**GOGAMA DISTRICT**



Division of Timber Management  
**Ontario Department of Lands and Forests**





## PREFACE

● A country's natural resources determine to a very great extent its economic position among its neighbours. The extent to which it is able to use these resources wisely determines its ability to maintain its economic position, to take full advantage of new technological developments and to promote a sound economy. At a time when all of our resources are being so prodigally spent, when other nations throughout the world are experiencing extreme shortages, and when it is apparent that there is no such thing as an inexhaustible supply, it is of greater importance than ever before that this basic wealth be wisely used.

Every operation in growing, transporting, and using forest products starts a flow of income the ultimate recipients of which are far removed in time and space from the original operation. No amount of search will discover all of the benefits derived from the multitude of uses of forests and forest products, but a recognition of the ever-widening circle of these benefits is necessary to clearly understand the economic role of forests. An appreciation of these values must be based upon a realistic appraisal of the present status of the resource, its importance in the social and economic life of the province and the problems involved in its full development. One of the important undertakings of the Department of Lands and Forests in recent years is, therefore, a province-wide survey of the forest resources of Ontario as the first step in a broad program of forest management and development.

The survey was authorized and work started by the Division of Timber Management early in 1946. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to Ontario, one-half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources, the Department of Lands and Forests which administers them, has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these forest administrative districts, totalling 172,000 square miles in area, and comprising the exploitable or accessible forest area of Ontario. This report, the thirteenth in the series, deals with the results of the inventory in the Gogama district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the province as a whole. At the same time the report supplies the essential data for the planning of the long term management of the forest resources.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	20
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	22
AREAS.....	9	APPENDIX.....	24
FOREST LAND OWNERSHIP.....	10	SURVEY METHODS.....	24
AGE CLASSES.....	11	MEAN ANNUAL INCREMENT.....	24
REGIONAL FOREST TYPES.....	12	AGE CLASSES.....	24
COVER TYPES.....	13	ROTATION.....	25
VOLUME.....	14	ALLOWABLE CUT.....	25
CONIFERS VS. HARDWOODS.....	17	CULL FACTOR.....	26
SAWLOGS VS. PULPWOOD.....	18		

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES, GOGAMA DISTRICT.....	9	FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	19
FIG. 2 — LAND OWNERSHIP WITHIN THE GOGAMA DISTRICT.....	11	FIG. 10 — VOLUME OF MATURE TIMBER BY SIZE CLASSES ON PATENTED LAND.....	19
FIG. 3 — GOGAMA DISTRICT, 1953.....	11	FIG. 11 — VOLUME OF THE PRIMARY GROWING STOCK OF CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	20
FIG. 4 — ECOLOGICAL DIVISIONS.....	12	FIG. 12 — VOLUME OF THE PRIMARY GROWING STOCK OF THE PRINCIPAL HARDWOOD SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	20
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	13	FIG. 13 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON CROWN LANDS IN THE GOGAMA DISTRICT.....	21
FIG. 6 — VOLUME OF THE PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	15	FIG. 14 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LANDS IN THE GOGAMA DISTRICT.....	23
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SPECIES AND AGE CLASSES....	17	FIG. 15 — AREA COMPANY INVENTORY USED.....	24
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	18		





# SURVEY HIGHLIGHTS

1. The total area of the Gogama district is 4,010,249 acres or 6,266 square miles. Productive forest lands cover 86 per cent of the total area, non-productive forest lands slightly over 6 per cent, water 7 per cent and non-forested lands less than one per cent.

2. Of the total area 97 per cent is Crown land and 3 per cent patented land. Ninety-six per cent of the patented land is concentrated in six townships which originally formed part of the Algoma Eastern Railway land grant.

3. The age class distribution represents a natural state due to the small scale of utilization in the Gogama District. For the productive forest the age class distribution shows: 53 per cent mature, 31 per cent immature, 7 per cent young growth and 9 per cent reproducing forest.

4. For the district as a whole the mixedwoods type predominates occupying 45 per cent of the productive forest area. The coniferous type occupies 40 per cent, the hardwood type 6 per cent and the remaining 9 per cent is reproducing forest.

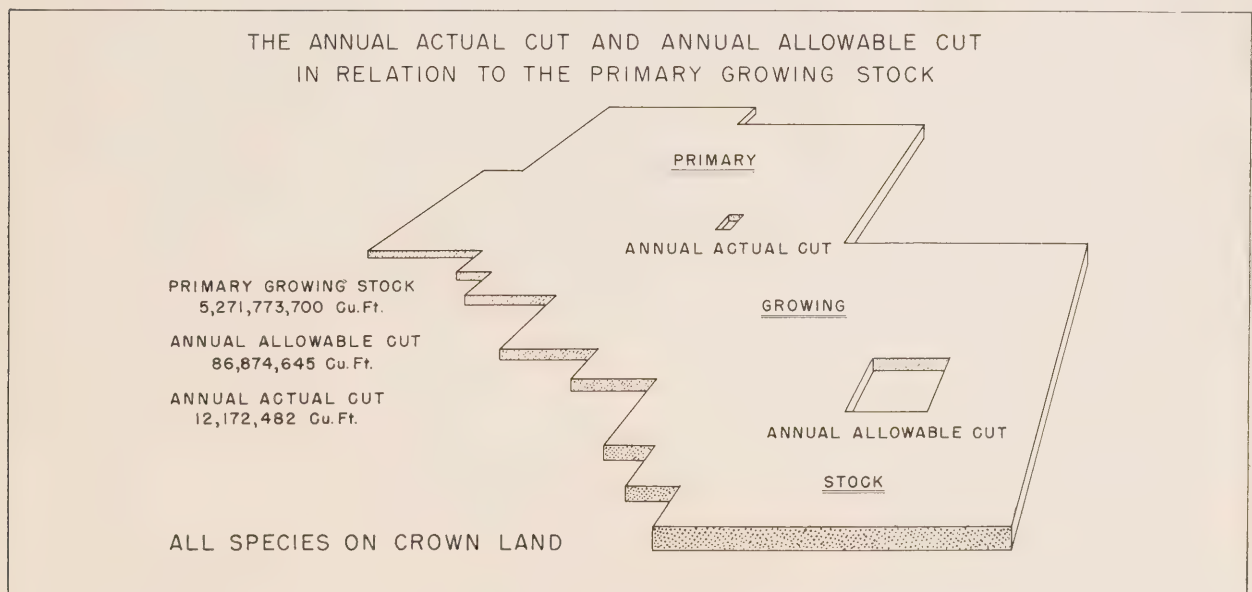
5. The volume of the primary growing stock on Crown lands in the Gogama District is 5,271,773,700 cubic feet — an average of 1,582 cubic feet per acre. Conifers comprise 62 per cent of the total volume on Crown lands.

6. In the mature age class on Crown lands 1,776 million cubic feet or 49 per cent of the volume

is in the 4-9 inch size class and 1,858 million cubic feet or 51 per cent is in the sawlog size class. For conifers on Crown lands 45 per cent is of sawlog size and 55 percent of the mature volume is of pulpwood size. Jack pine is the principal conifer making up 34 per cent of the coniferous sawlog volume. White spruce is second in importance producing 23 per cent of the coniferous sawlog volume.

7. The annual allowable cut for Crown lands in the Gogama district is 86,874,645 cubic feet. Of this volume 51 per cent is conifers and 49 per cent hardwoods. The coniferous allowable cut volume is made up of 44 per cent jack pine, 41 per cent white and black spruce, 8 per cent balsam fir, 5 per cent white and red pine and 2 per cent other conifers. The hardwood allowable cut is 69 per cent poplar, 30 per cent white birch and one per cent other hardwoods.

8. A comparison of the allowable cut with the actual utilization shows that only 14 per cent of the allowable cut is actually utilized. The utilization is almost wholly confined to the valuable softwood species for which 27 per cent of the allowable cut is utilized. Jack pine is the most extensively utilized species with 41 per cent of the allowable cut utilized, followed by black and white spruce with 16 per cent under utilization. Small quantities of white and red pine and balsam fir are utilized.





MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 10 20 30 40 50

MARCH 1951



*Forest resources inventory photograph of the Settlement of Gogama, taken with a six-inch focal length aerial camera from an altitude of 7,920 feet. Scale of photograph: 4 inches to the mile.*





# FOREST INVENTORY

## Areas



● The total area of the Gogama district, excluding Indian Reserve lands, is 4,010,249 acres or 6,266 square miles. Productive forest lands cover 3,455,296 acres (table 1) or 86 per cent of the total area. Non-forested lands, including lands permanently withdrawn from timber production, comprise only 11,424 acres, an inappreciable portion of the total area. Non-productive forest lands, which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 259,473 acres or less than 7 per cent of the total area. Water covers an area of 284,056 acres or 7 per cent of the total area (fig. 1).

The Gogama district is essentially a timber producing area with 86 per cent of the total area classified as productive forest land. The district lies on

the Height-of-Land at the headwaters of rivers flowing into James Bay and the "Great Lakes" drainage system. Agriculture has not penetrated into the district which contains only 212 acres of developed agricultural land. The thin rocky soils covering most of the district offer little prospect for future farming except possibly along the northern reaches where the district borders on the Clay Belt region. Industrial progress in the district has been slow and is confined to a few small mining properties and the sawmilling industry located along the main line of the Canadian National Railway which traverses the district in a north-westerly direction. Within the past year a road has been completed connecting Gogama, one of the larger settlements located centrally in the district, with the main highway system of the province. Other roads are planned for the opening up of the district which promise further development of the resources

TABLE 1. — *Total area classification into broad land and ownership groupings.*

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	3,333,060	122,236	3,455,296
Non-forested land <sup>2</sup>			
Developed agricultural land.....	62	150	212
Grass and meadow land.....	5,018		5,018
Non-reproducing burn.....	2,195		2,195
Unclassified land <sup>3</sup> .....	3,499	500	3,999
TOTAL .....	10,774	650	11,424
Non-productive forest <sup>4</sup>			
Open muskeg.....	100,914	1,456	102,370
Treed muskeg (scrub).....	82,020	2,818	84,838
Brush, alder, and flooded land.....	66,863	3,190	70,053
Rock outcrop.....	1,953		1,953
Barrens.....	259		259
TOTAL .....	252,009	7,464	259,473
Water.....	284,056		284,056
TOTAL AREA.....	3,879,899	130,350	4,010,249

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

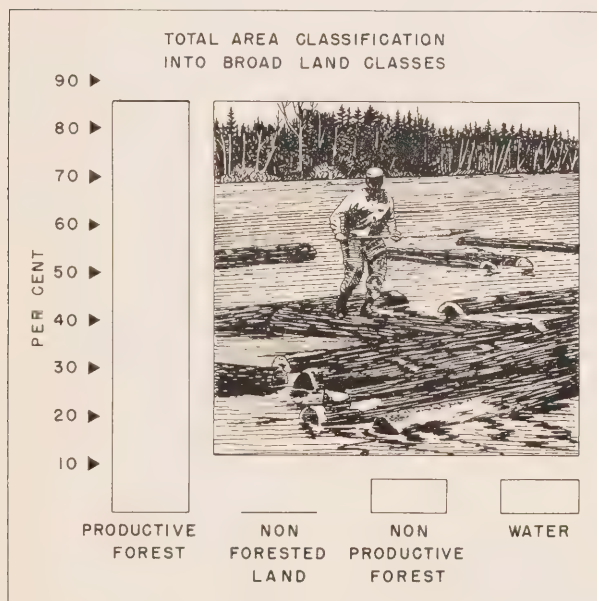


FIGURE 1



*In addition to the regular ranger staff, more than 3,000 extra fire fighters were required in Ontario, in 1953, to prevent the spread of forest fires and minimize timber and pulpwood losses.*

in the near future. Except for the limited growth of the sawmilling industry in the district and considerable cutting of pulpwood for manufacture in pulp and paper mills located outside of the district, the natural condition of the forests has been little disturbed.

#### *Forest Land Ownership*



It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement and lands have been granted

or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort and for other uses. All of the various types of ownership are grouped under "Patented Lands" which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to the Crown at the time patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands presents, therefore, a complicated picture. In the course of the inventory no attempt has been made to record separately, timber occurring on patented land, but reserved to and owned by the Crown.

Of the total area of the Gogama district amounting to 4,010,249 acres, 3,879,899 acres are owned by the Crown and 130,350 acres are patented lands (table 1). Of the total area 97 per cent is Crown land and 3 per cent is patented land (fig. 2). If only the productive forest area of 3,455,296 acres is considered, 96 per cent is in Crown ownership and 4 per cent patented land. The location of the



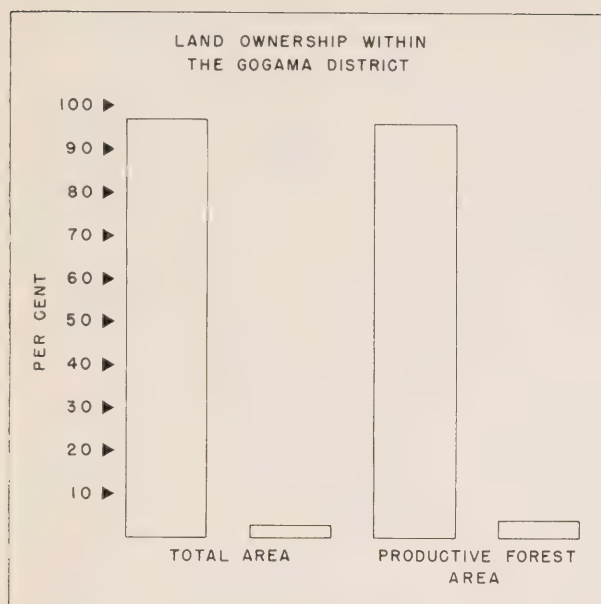


FIGURE 2

patented land is shown on the map of the Gogama district, figure 3.

Patented land in the district is contained, for the most part, in six townships which form a part of lands granted to the Algoma Eastern Railway in lieu of cash subsidy in the early days of railroad construction in the province. These townships contain 125,004 acres of patented land or 96 per cent of the total patented land in the district. The

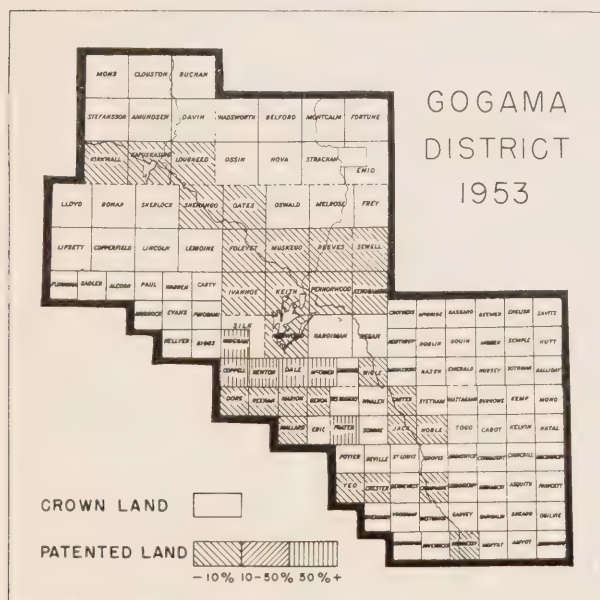


FIGURE 3

balance of 5,346 acres or only 4 per cent of the patented lands of the district is in small holdings along the railroad and in lands patented for mining purposes.

### Age Classes



For sustained yield operations, a forest should be made up of trees of all age classes and stages of development from seedlings to mature timber, in such proportions that when one group of trees is harvested, another is ready to take its place. Since forest utilization has been on a small scale in the Gogama district, the present age class distribution represents a natural state, unmodified by exploitation or management practices.

For the district as a whole, 1,826,085 acres or 53 per cent of the productive forest is mature and

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	807,059	20,410	827,469	24
Hardwood.....	60,599	662	61,261	2
Mixedwoods.....	897,271	40,084	937,355	27
TOTAL.....	1,764,929	61,156	1,826,085	53
Immature forest:				
Coniferous.....	469,477	22,098	491,575	14
Hardwood.....	99,109	5,614	104,723	3
Mixedwoods.....	476,352	20,044	496,396	14
TOTAL.....	1,044,938	47,756	1,092,694	31
Young growth:				
Coniferous.....	74,284	122	74,406	2
Hardwood.....	20,793	40	20,833	1
Mixedwoods.....	124,727	846	125,573	4
TOTAL.....	219,804	1,008	220,812	7
Reproducing forest.....	303,389	12,316	315,705	9
TOTAL PRODUCTIVE FOREST.....	3,333,060	122,236	3,455,296	100

over-mature, 1,092,694 acres or 31 per cent is immature, 220,812 acres or 7 per cent is young growth and 315,705 acres or 9 per cent is reproducing forest (table 2). Since 96 per cent of the productive forest land in the district is Crown land, the age class distribution for the Crown land portion does not differ from the distribution for productive forest lands.

On patented lands the mature forest covers 61,156 acres or 50 per cent of the productive forest on patented lands, 47,756 acres or 39 per cent is immature, 1,008 acres or one per cent is young growth and 12,316 acres or 10 per cent is classed as reproducing forest.

### *Regional Forest Types*



The regional distribution of forest types in Ontario is influenced by lowering in temperatures from south to north and a reduction in rainfall and general atmospheric humidity from east to west. The Gogama district, situated centrally in the province, is removed some distance from the influence of large bodies of water. The forests, therefore, show little differentiation, contain few species, and present average conditions for the Boreal forest belt of the province. The district lies on the main Height-of-Land area of the province with generally thin soils overlying the bedrock of predominantly crystalline granite. The topography is rough and broken, with a low relief. The forests of the district have been separated into three regions, or sections (fig. 4). For each region, or section, separate volume and yield tables are made and these serve as units in the compilation of volume estimates. The three regions are as follows:

1. The Central Transition section comprising 72 per cent of the total area covers the main central portion of the district.

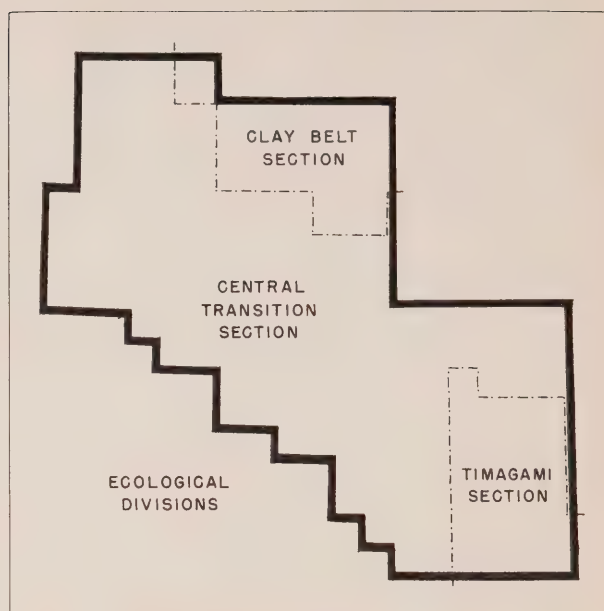


FIGURE 4

2. The Clay Belt section in the north-east portion of the district covers 11 townships amounting to 14 per cent of the total area.

3. The Timagami section covers 14 per cent of the total area occupying the south-easterly portion of the district.

The Central Transition section covering the greater part of the area of the district contains the typical forests of the Height-of-Land area of Ontario. Spruce-fir stands occupy all of the heavier well-drained soils as a mature forest. This section is within the area of the ecological optimum for the growth of jack pine which occupies all of the sand and gravelly soils as dense, well-developed stands of high yield. The relatively intolerant poplar and white birch are the only important broadleaved tree species.

The Clay Belt section which occupies 14 per cent of the total area of the district is covered by the deep water deposits of former glacial Lake Ojibway. The soils are fertile clays which support the most highly productive pulpwood forests of the province. Black spruce is the most important species, occurring on all productive forest sites; in pure stands in the wet lowlands and on the damp slopes, and mixed with white spruce, balsam fir, poplar and white birch on the uplands. Jack pine occurs sporadically on the limited areas of sandy soils.

The Timagami section is noteworthy for the presence of extensive areas of stands of red and

white pine, which in the absence of intensive competition from the tolerant hardwood components of the Algonquin section have a tendency to grow in relatively pure stands on all of the well-drained soils. Along with the pine are found the characteristic components of the Boreal forest, black and white spruce, balsam fir and jack pine. Poplar and white birch are the only broadleaved species of importance in this section.

### Cover Types



The forests of the Gogama district are made up of 12 commonly occurring tree species. Six species comprise 93 per cent of the total growing stock. Black spruce is the most important conifer making up 22 per cent of the primary growing stock, closely followed by jack pine with 20 per cent. White spruce forms 8 per cent and balsam fir 5 per cent of the total wood volume. The two intolerant hardwoods, poplar and white birch, together make up 38 per cent of the growing stock; 22 per cent is poplar and 16 per cent is white birch. Cedar, white and red pine and larch are represented in the stands. Hard maple and yellow birch occur only as extra-regional outliers.

The forests of the district are described under three main cover types, coniferous, hardwood and mixedwoods. The coniferous type is composed of 75 per cent or more conifers or softwood trees; the hardwood type contains 75 per cent or more hardwood or broadleaved trees. All other associations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts areas of reproducing forests, too recently established to have attained a sufficiently stable composition to be classified into cover types. These areas are referred to as reproducing forests.

Over the district as a whole the mixedwoods type predominates occupying 1,559,324 acres or 45 per cent of the productive forest area. The

TABLE 3. — *Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	807,059	24	20,410	17	827,469	24
Immature.....	469,477	14	22,098	18	491,575	14
Young growth.....	74,284	2	122	*	74,406	2
TOTAL.....	1,350,820	40	42,630	35	1,393,450	40
Hardwood type:						
Mature.....	60,599	2	662	*	61,261	2
Immature.....	99,109	3	5,614	5	104,723	3
Young growth.....	20,793	1	40	*	20,833	1
TOTAL.....	180,501	6	6,316	5	186,817	6
Mixedwoods type:						
Mature.....	897,271	27	40,084	33	937,355	27
Immature.....	476,352	14	20,044	16	496,396	14
Young growth.....	124,727	4	846	1	125,573	4
TOTAL.....	1,498,350	45	60,974	50	1,559,324	45
Reproducing forest.....	303,389	9	12,316	10	315,705	9
TOTAL PRODUCTIVE FOREST.....	3,333,060	100	122,236	100	3,455,296	100

\* Less than one per cent.

coniferous type covers 1,393,450 acres or 40 per cent, and the hardwood type 186,817 acres or 6 per cent of the total area. The balance of 315,705 acres or 9 per cent is reproducing forest (table 3, fig. 5).

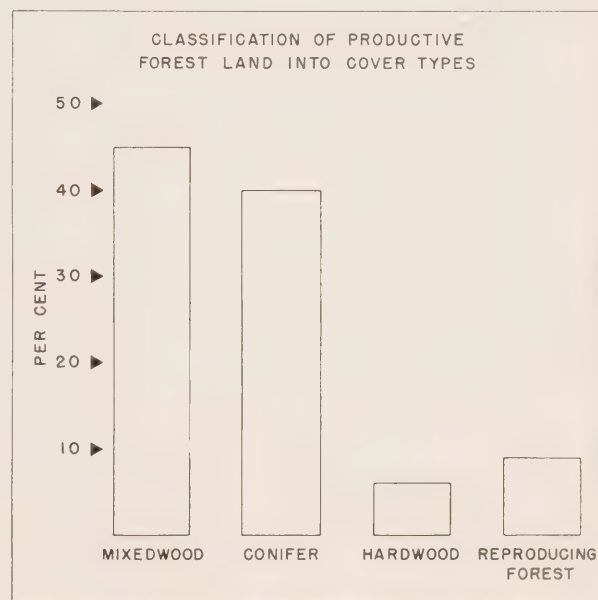


FIGURE 5



Due to the relatively small area of patented lands in the district, the forest cover distribution on Crown lands is very similar to the productive forest as a whole with: 45 per cent mixedwoods, 40 per cent coniferous, 6 per cent hardwoods and 9 per cent reproducing forest.

Patented lands with a total area of productive forest land of 122,236 acres shows a cover type distribution with: 60,974 acres or 50 per cent mixedwoods, 42,630 acres or 35 per cent coniferous, 6,316 acres or 5 per cent hardwood and 12,316 acres or 10 per cent reproducing forest.

During the summer of 1941 a large forest fire occurred in the western part of the district and 65,830 acres of this area were burned over again in the spring of 1951. The reburned area has been classified as reproducing forest, although the chances of adequate reproduction taking place naturally on an area burned over severely, twice in ten years, are very slight. About all that can be expected is a stand of intolerant hardwoods originating from coppice growth of white birch and root sprouts of poplar.

## Volume



The volume of the primary growing stock includes all living trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Gogama district is almost 5.5 billion cubic feet (5,489,530,300 cubic feet). This is an average of 1,589 cubic feet per acre (table 4). The mature age class contains 3.8 billion cubic feet (table 5) or 2,064 cubic feet per



*Communications are important in any battle — the war against forest fire is no exception. 572 units, from 2½ to 500 watts, as well as 41 aircraft installations and 17 airborne "ground hailers" are thus employed by Ontario's forest protection service. Above is the "key" station at Maple.*

acre, while the immature age class contains 1.7 billion cubic feet (fig. 6) or 1,575 cubic feet per acre.

Crown lands maintain a primary growing stock of 5,271,773,700 cubic feet (table 6) or an average of 1,582 cubic feet per acre. Of the volume of the primary growing stock on Crown lands, the mature age class contains 69 per cent, or 2,059 cubic feet per acre; the immature age class contains 31 per cent, or 1,567 cubic feet per acre.

Within the Gogama district patented lands are limited in area and contain only 217,756,600 cubic feet (table 7), or 1,781 cubic feet per acre. The total volume on patented lands is distributed with about 135 million cubic feet in mature and over-mature stands and 83 million cubic feet in immature stands. The mature age class supports 2,200 cubic feet per acre; the immature, 1,742 cubic feet per acre.

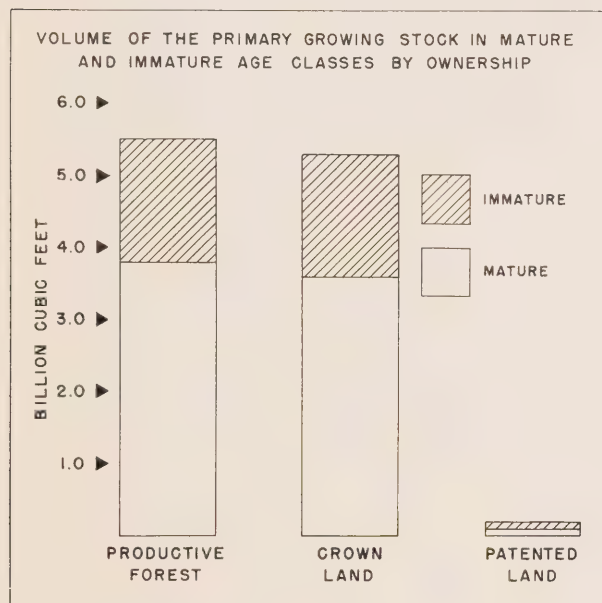


FIGURE 6

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average Total
	4''-9'' d.b.h.	10'' + d.b.h.	Average	4''-9'' d.b.h.	10'' + d.b.h.	Average	
	cu. ft.	cu. ft.		cu. ft.	cu. ft.		
Mature.....	1,006	1,053	2,059	1,089	1,111	2,200	2,064
Immature.....	1,235	332	1,567	1,409	333	1,742	1,575
Productive forest.....	920	662	1,582	1,095	686	1,781	1,589

TABLE 5. — *Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Gogama district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	932,295	590,931	606,290	105,448	2,234,964
Hardwood.....	72,632	99,378	157,809	37,044	366,863
Mixedwoods.....	837,884	1,235,544	593,430	220,845	2,887,703
TOTAL.....	1,842,811	1,925,853	1,357,529	363,337	5,489,530

ALL CONIFERS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	874,114	518,202	564,104	84,551	2,040,971
Hardwood.....	9,703	8,902	12,529	6,115	37,249
Mixedwoods.....	419,384	540,141	262,497	98,609	1,320,631
TOTAL.....	1,303,201	1,067,245	839,130	189,275	3,398,851

ALL HARDWOODS					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	58,181	72,729	42,186	20,897	193,993
Hardwood.....	62,929	90,476	145,280	30,929	329,614
Mixedwoods.....	418,500	695,403	330,933	122,236	1,567,072
TOTAL.....	539,610	858,608	518,399	174,062	2,090,679

TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown land in the Gogama district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	903,679	572,646	574,027	99,188	2,149,540
Hardwood.....	71,781	98,562	150,942	35,509	356,794
Mixedwoods.....	800,765	1,186,704	565,253	212,718	2,765,440
TOTAL.....	1,776,225	1,857,912	1,290,222	347,415	5,271,774

TABLE 7. — *Cubic-foot volumes of primary growing stock on patented land in the Gogama district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	28,616	18,285	32,263	6,260	85,424
Hardwood.....	851	816	6,867	1,535	10,069
Mixedwoods.....	37,119	48,840	28,177	8,127	122,263
TOTAL.....	66,586	67,941	67,307	15,922	217,756

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	847,862	501,999	534,614	79,062	1,963,537
Hardwood.....	9,613	8,801	11,901	5,677	35,992
Mixedwoods.....	401,830	519,757	250,081	95,130	1,266,798
TOTAL.....	1,259,305	1,030,557	796,596	179,869	3,266,327

ALL CONIFERS					
Cover type	Mature		Immature		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	26,252	16,203	29,490	5,489	77,434
Hardwood.....	90	101	628	438	1,257
Mixedwoods.....	17,554	20,384	12,416	3,479	53,833
TOTAL.....	43,896	36,688	42,534	9,406	132,524

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	55,817	70,647	39,413	20,126	186,003
Hardwood.....	62,168	89,761	139,041	29,832	320,802
Mixedwoods.....	398,935	666,947	315,172	117,588	1,498,642
TOTAL.....	516,920	827,355	493,626	167,546	2,005,447

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,364	2,082	2,773	771	7,990
Hardwood.....	761	715	6,239	1,097	8,812
Mixedwoods.....	19,565	28,456	15,761	4,648	68,430
TOTAL.....	22,690	31,253	24,773	6,516	85,232



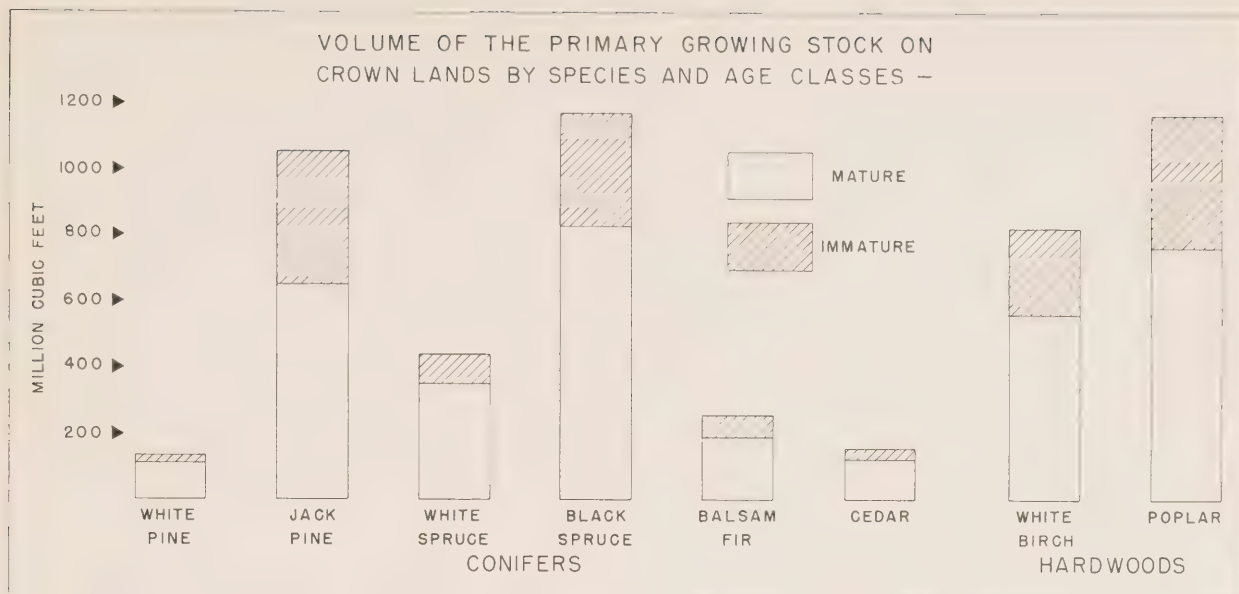


FIGURE 7

#### Conifers vs. Hardwoods

The volume of the primary growing stock on productive forest lands in the Gogama district is 62 per cent conifers, or softwood species, and 38 per cent hardwoods. Conifers total 3,399 million cubic feet and hardwoods 2,091 million cubic feet (table 8). In the mature age class conifers comprise 2,370 million cubic feet or 63 per cent and hardwoods 1,398 million cubic feet or 37 per cent of the mature volume. The immature age class shows a slight decrease in the coniferous content as 1,028 million cubic feet or 60 per cent is conifer or softwood volume and 692 million cubic feet or 40 per cent hardwood.

On Crown lands, 3,266 million cubic feet are conifers or softwood species and 2,005 million cubic feet are hardwoods (table 9). The division into conifers and hardwoods for the total volume on Crown lands and for the mature and immature age classes separately, is very similar to the forested area as a whole.

On patented lands, the coniferous volume is 133 million cubic feet or 61 per cent of the total volume on patented lands, while the volume of hardwoods is 85 million cubic feet or 39 per cent of the total volume (table 10). In the mature age class the volume is 60 per cent conifers and 40 per cent hardwoods; in the immature age class the conifers comprise 62 per cent of the volume and hardwoods 38 per cent.

The principal species on Crown land making up

the two groups, conifers and hardwoods, are shown in figure 7. Two conifers, jack pine and black spruce; and two intolerant hardwoods, white birch

TABLE 8. — *Cubic-foot volumes of primary growing stock on productive forest land in the Gogama district by species and age classes in two size classes.*

Species	Mature		Immature		Total all lands
	4"—9" d.b.h.	10" up d.b.h.	4"—9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	3,314	107,742	6,361	17,377	134,794
Red pine.....	2,075	40,394	3,652	8,395	54,516
Jack pine.....	317,961	366,258	351,032	79,635	1,114,886
White spruce.....	113,815	247,302	56,905	33,445	451,467
Black spruce.....	663,073	185,501	335,762	28,187	1,212,523
Balsam fir.....	156,165	35,498	59,495	6,490	257,648
White cedar.....	44,387	84,426	17,542	15,403	161,758
Larch.....	2,411	124	8,381	343	11,259
<b>TOTAL CONIFERS</b>	<b>1,303,201</b>	<b>1,067,245</b>	<b>839,130</b>	<b>189,275</b>	<b>3,398,851</b>
Hard maple.....	1,199	1,600	1,261	359	4,419
Yellow birch.....	1,629	13,504	382	897	16,412
Ironwood.....	6				6
White birch.....	305,606	279,924	205,163	63,847	854,540
Poplar.....	231,101	563,559	311,544	108,959	1,215,163
Red maple.....	69	21	49		139
<b>TOTAL HARDWOODS</b>	<b>539,610</b>	<b>858,608</b>	<b>518,399</b>	<b>174,062</b>	<b>2,090,679</b>
<b>TOTAL ALL SPECIES</b>	<b>1,842,811</b>	<b>1,925,853</b>	<b>1,357,529</b>	<b>363,337</b>	<b>5,489,530</b>

and poplar, comprise 80 per cent of the total volume. Jack pine and black spruce are the most important conifers constituting 68 per cent of the coniferous volume. White spruce makes up 13 per cent, balsam fir 8 per cent, and the balance is made up of small quantities of white and red pine, white cedar and larch. White birch and poplar make up 99 per cent of the total hardwood volume on Crown lands; 58 per cent is poplar and 41 per cent is white birch. Maple and yellow birch are represented in the hardwood volume.

TABLE 9. — *Cubic-foot volumes of primary growing stock on Crown lands in the Gogama district by species and age class in two size classes.*

Species	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	3,312	107,666	6,348	16,966	134,292
Red pine.....	2,075	40,379	3,651	8,394	54,499
Jack pine.....	299,938	348,848	329,425	74,768	1,052,979
White spruce...	110,577	239,618	55,962	32,613	438,770
Black spruce....	646,155	178,819	318,474	26,062	1,169,510
Balsam fir.....	152,812	35,007	58,514	6,427	252,760
White cedar.....	42,284	80,109	16,731	14,332	153,456
Larch.....	2,152	111	7,491	307	10,061
TOTAL CONIFERS.....	1,259,305	1,030,557	796,596	179,869	3,266,327
Hard maple.....	1,198	1,600	1,261	359	4,418
Yellow birch....	1,627	13,488	378	862	16,355
Ironwood.....	6				6
White birch.....	293,141	268,438	197,026	62,294	820,899
Poplar.....	220,879	543,808	294,917	104,031	1,163,635
Red maple.....	69	21	44		134
TOTAL HARDWOODS	516,920	827,355	493,626	167,546	2,005,447
TOTAL ALL SPECIES.....	1,776,225	1,857,912	1,290,222	347,415	5,271,774

### Sawlogs vs. Pulpwood

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as pulpwood and cordwood material, depending on species, although poles, railway ties, and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for

sawlogs and other uses where large timber is required. A tree 10 inches d.b.h. outside bark will, on the

TABLE 10. — *Cubic-foot volumes of primary growing stock on patented land in the Gogama district by species and age class in two size classes.*

Species	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	2	76	13	411	502
Red pine.....		15	1	1	17
Jack pine.....	18,023	17,410	21,607	4,867	61,907
White spruce....	3,238	7,684	943	832	12,697
Black spruce....	16,918	6,682	17,288	2,125	43,013
Balsam fir.....	3,353	491	981	63	4,888
White cedar.....	2,103	4,317	811	1,071	8,302
Larch.....	259	13	890	36	1,198
TOTAL CONIFERS.....	43,896	36,688	42,534	9,406	132,524
Hard maple.....	1				1
Yellow birch....	2	16	4	35	57
Ironwood.....					
White birch.....	12,465	11,486	8,137	1,553	33,641
Poplar.....	10,222	19,751	16,627	4,928	51,528
Red maple.....			5		5
TOTAL HARDWOODS	22,690	31,253	24,773	6,516	85,232
TOTAL ALL SPECIES.....	66,586	67,941	67,307	15,922	217,756

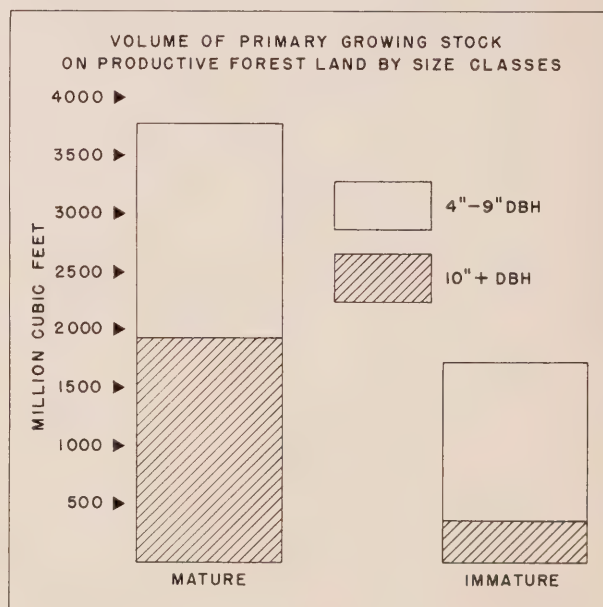


FIGURE 8

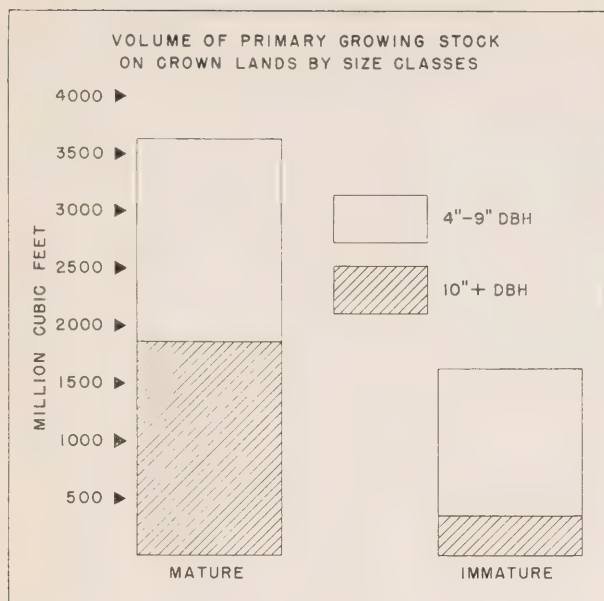


FIGURE 9

average, give one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition, there is residual smaller size material in the top, which may be used as pulpwood or for purposes other than saw timber. The quantity in this residual top is relatively small and is included in the 10 inches and over material in all inventory estimates.

Of the volume of the primary growing stock on productive forest lands, 3,200 million cubic feet are in the 4-9 inch d.b.h. size class and 2,289 mil-

lion cubic feet in the 10 inch d.b.h. class and over (table 8). Fifty-eight per cent of the total volume is in the pulpwood size class and 42 per cent is of sawlog size. Considering only the mature age class, nearly equal volumes are contained in the two size classes, with 1,843 million cubic feet in the 4-9 inch size class and 1,926 million cubic feet 10 inches d.b.h. and over (fig. 8).

On Crown lands, 3,066 million cubic feet or 58 per cent is in the 4-9 inch size class and 2,205 million cubic feet or 42 per cent is in the 10 inch and over class (table 9). For the mature age class on Crown lands, 1,776 million cubic feet or 49 per cent of the volume is in the 4-9 inch size class and 1,858 million cubic feet or 51 per cent is in the sawlog size class (fig. 9).

Patented lands cover a very small area within the district and produce only 218 million cubic feet (table 10). Of this volume, 61 per cent is in the 4-9 inch size class and 39 per cent in the 10 inch and over class. The mature forest has a volume almost equally distributed between the sawlog and pulpwood size classes (fig. 10).

The sawlog size class in the mature forest on Crown lands is made up of 1,031 million cubic feet of conifers and 827 million cubic feet of hardwoods (table 9). Only about 45 per cent of the mature conifers are of sawlog size while 62 per cent of the mature hardwoods are in the sawlog class. Jack pine is the principal conifer in the sawlog size class, making up 34 per cent of the coniferous

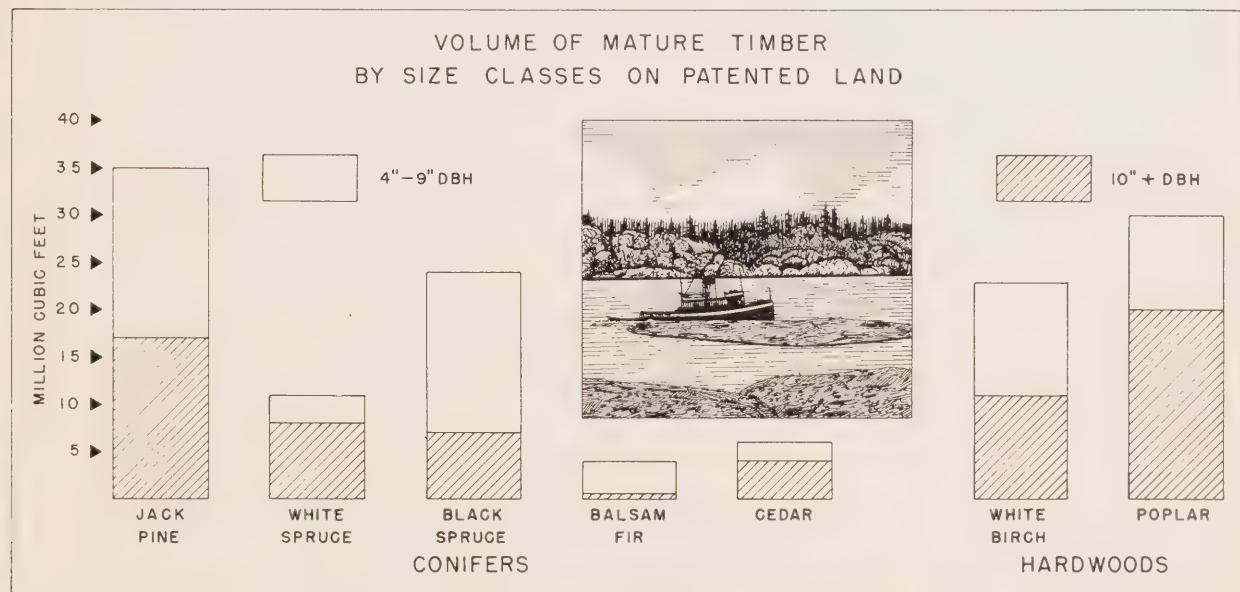


FIGURE 10



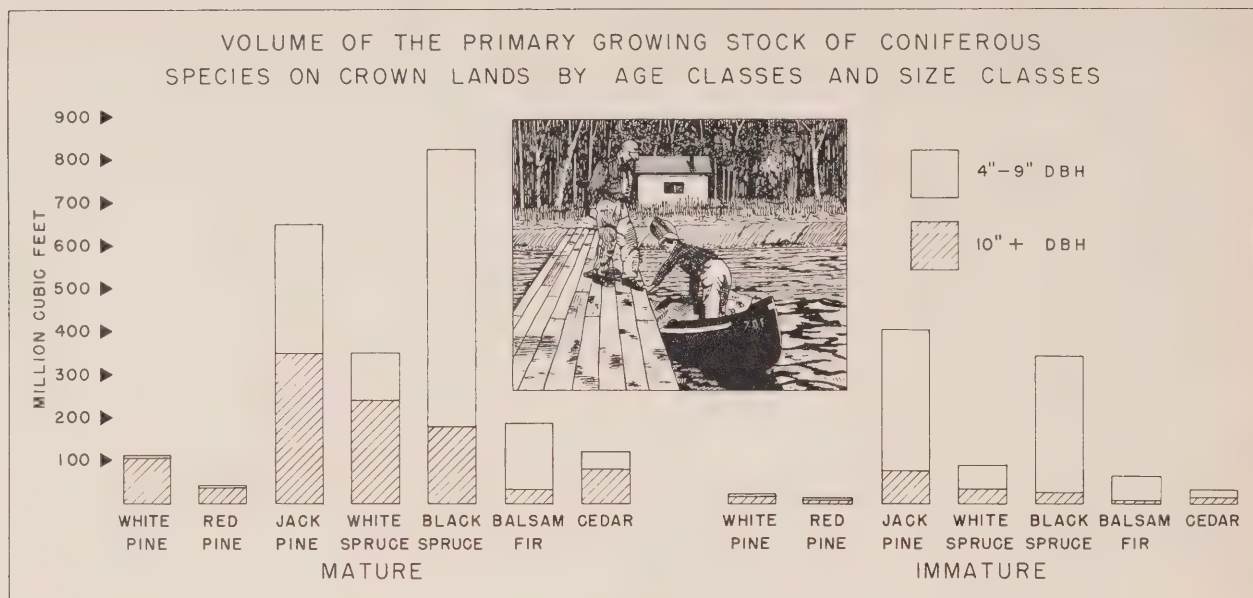


FIGURE 11

sawlog volume; white spruce is next in importance, forming 23 per cent (fig. 11). Black spruce supplies 17 per cent of the total softwood sawlog volume, but since only 22 per cent of the mature volume of black spruce on Crown lands is of sawlog size, this sawlog volume is scattered through stands mainly of value for pulpwood. The balance of 26 per cent of the coniferous sawlog material is made up of 14 per cent red and white pine and 12 per cent balsam fir, white cedar and larch.

White birch and poplar are the principal hardwood or broadleaved species in the district. The total volume of hardwoods on Crown lands is 2,005 million cubic feet or 38 per cent of the total volume on Crown lands. The major portion of the hardwood sawlog size class comes from poplar in the mature age class (fig. 12). Poplar forms 66 per cent of the total mature hardwood volume of sawlog size, white birch makes up 32 per cent and the balance of 2 per cent is made up of small quantities of maple and yellow birch.

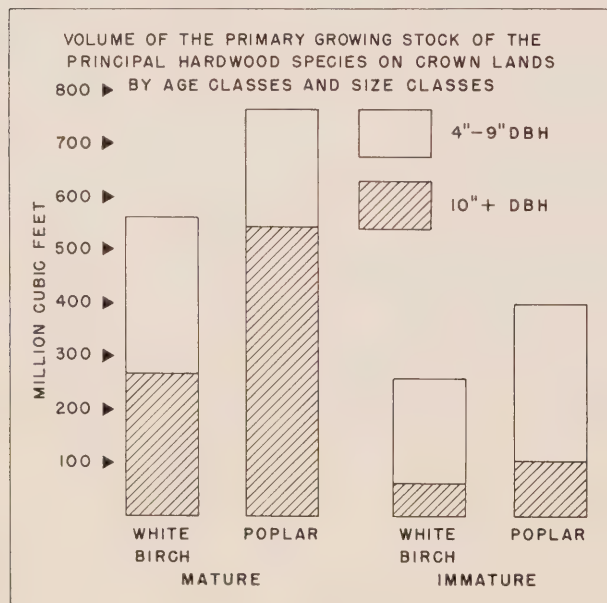


FIGURE 12

### Allowable Cut



The allowable cut has been computed for each species with the aid of a volumetric formula<sup>1</sup> and appropriate rotation<sup>2</sup> for species. Thus the amount of the allowable cut results from the volume of the primary growing stock and rotation for each

<sup>1</sup> Method of calculation of allowable cut is given in Appendix, methods allowable cut, page 25.

<sup>2</sup> Rotation by species, table 16, page 25.

species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may appear on areas which, at the moment, are inaccessible to operations or which are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential, rather than actually available under present operating conditions.

The calculation of allowable cut, based on the present volume of the primary growing stock is of value for a period of about ten years. This is because of woods operations being carried out and the present stands growing in volume, each year. Therefore, the size and structure of the primary growing stock, regarded as the foundation of the allowable cut calculations, change also from year to year; and for that reason, on expiration of the initial ten year period, the allowable cut should be calculated anew. With effective forestry practices allowable cuts for the valuable species will increase; without them the present trend to more poplar and white birch may continue.

The annual allowable cut, or net depletion allowable under management, in the Gogama district is 90,460,235 cubic feet; 86,874,645 cubic feet from Crown lands and 3,585,590 cubic feet from patented lands. Of the total allowable cut, 96 per cent is on Crown lands and 4 per cent on patented lands.

CROWN LANDS

The annual allowable cut for Crown lands repre-

sents 1.6 per cent of the primary growing stock or 26.1 cubic feet per acre of the productive forest area. Of the total allowable cut, 43,978,535 cubic feet or 51 per cent is coniferous species and 42,896,110 cubic feet or 49 per cent is of hardwood species. Since the rotation is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.3 per cent of the coniferous primary growing stock and 2.1 per cent for the hardwoods.

The annual allowable cut for the species making up the coniferous content (table 11) shows that 44 per cent is jack pine, 41 per cent white and black spruce, 8 per cent balsam fir, 5 per cent white and red pine and 2 per cent other conifers. The relationship of the allowable cut for a ten-year period to the volume of the coniferous primary growing stock on Crown lands by species is shown graphically, figure 13.

TABLE 11. — Annual allowable cut for coniferous species on Crown lands in the Gogama district.

Species	Annual allowable cut cu. ft.
White pine.....	1,425,875
Red pine.....	694,400
Jack pine.....	19,166,115
White spruce.....	5,590,475
Black spruce.....	12,417,550
Balsam fir.....	3,578,320
White cedar.....	977,610
Larch.....	128,190
TOTAL CONIFERS.....	43,978,535

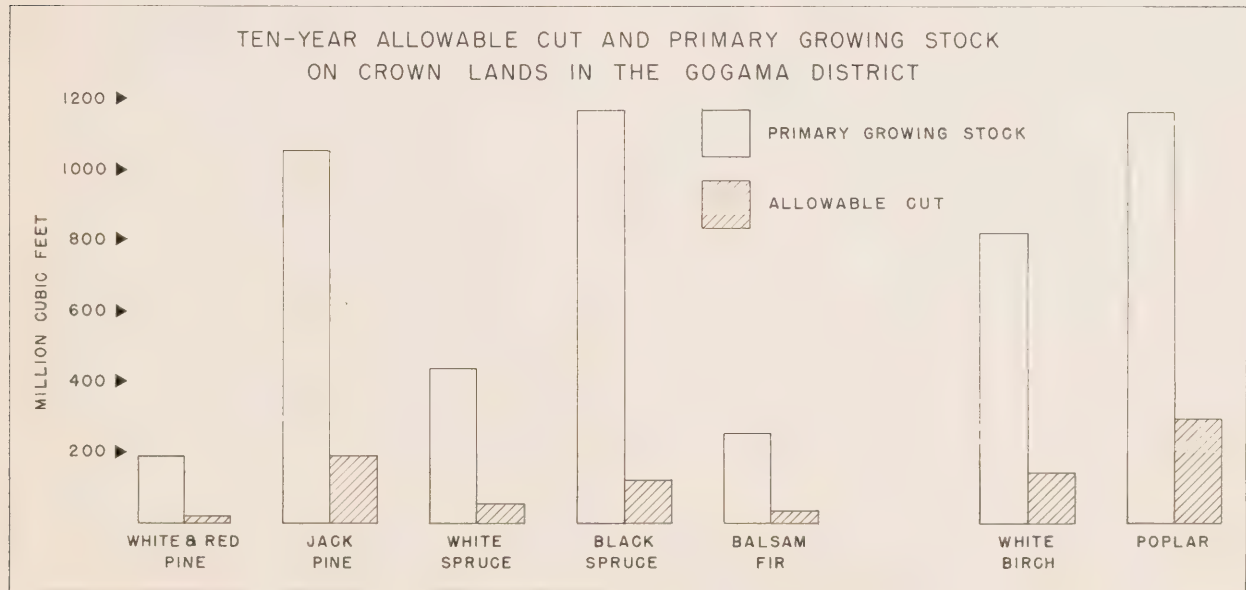


FIGURE 13

The species making up the hardwood content (table 12) show that 69 per cent is poplar, 30 per cent white birch and one per cent other hardwoods. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods is shown graphically, figure 13.

TABLE 12. — *Annual allowable cut for hardwood species on Crown lands.*

Species	Annual allowable cut <i>cu. ft.</i>
White birch.....	13,074,115
Poplar .....	29,652,410
Others .....	169,585
TOTAL HARDWOODS.....	42,896,110

#### PATENTED LANDS

The annual allowable cut for patented lands amounts to 3,585,590 cubic feet, which represents 1.6 per cent of the primary growing stock, or 29.3 cubic feet per acre of the productive forest land. The annual allowable cut on patented lands is 1.4 per cent of the coniferous primary growing stock and 2.1 per cent for the hardwoods.

The annual allowable cut for coniferous species on patented lands is 1,811,395 cubic feet, and for hardwoods, 1,774,195 cubic feet. Almost one-half of the allowable cut is for the two intolerant hardwood species, poplar and white birch, which together contribute 1,773,645 cubic feet to the total allowable cut. For the coniferous species jack pine is most important, followed by spruce. Other conifers are present in inappreciable volumes (table 13).

TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut <i>cu. ft.</i>
White pine.....	5,120
Red pine.....	195
Jack pine.....	1,080,990
White spruce.....	155,210
Black spruce .....	438,115
Balsam fir.....	66,375
White cedar.....	50,740
Larch.....	14,650
TOTAL CONIFERS.....	1,811,395
White birch.....	514,010
Poplar .....	1,259,635
Others .....	550
TOTAL HARDWOODS .....	1,774,195
TOTAL.....	3,585,590

#### Utilization vs. Allowable Cut



According to the Classification of Annual Timber Returns for the period 1947–1949<sup>1</sup>, wood and forest products were cut on Crown lands in the Gogama district as follows:

Logs, booms and dimension timber.....	11,225,995 F.B.M. Doyle rule
Piling.....	296 pieces
Rafters.....	479 pieces
Poles.....	29,980 pieces
Ties.....	21,373 pieces
Car stakes.....	4,609 pieces
Posts.....	1,221 pieces
Pulpwood.....	46,750 cords
Fuelwood.....	1,912 cords

By the use of appropriate converting factors, these amounts are expressed in gross total cubic feet (table 14) and are comparable with the figures for allowable cut.

TABLE 14. — *Gross total cubic volume of wood utilized annually in the Gogama district.*

Species	Wood utilized <i>cu. ft.</i>	Total <i>per cent</i>
Pine, white and red.....	1,301,571	11
Jack pine.....	7,783,598	64
Spruce, white and black.....	2,802,085	23
Balsam fir.....	46,467	...
White cedar.....	3,940	...
TOTAL CONIFERS.....	11,937,661	98
White birch.....	95,766	1
Poplar.....	139,055	1
TOTAL HARDWOODS.....	234,821	2
TOTAL.....	12,172,482	100

A comparison of the annual allowable cut with the actual utilization, by species (table 15) shows that the actual cut was only 14 per cent of the allowable cut for the district as a whole. The utilization is almost wholly confined to the valuable softwood species with an allowable cut of 44 million

<sup>1</sup> Reports of the Minister of Lands and Forests, for the Province of Ontario, for the fiscal years ending March 31, 1948–1950.



TABLE 15. — Comparison of the allowable cut with the actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red.....	2,120	1,302
Jack pine.....	19,166	7,784
Spruce, white and black.....	18,008	2,802
Balsam fir.....	3,578	46
White cedar.....	978	4
Larch.....	128	
<b>TOTAL CONIFERS.....</b>	<b>43,978</b>	<b>11,938</b>
White birch.....	13,074	96
Poplar.....	29,652	139
Others.....	170	
<b>TOTAL HARDWOODS.....</b>	<b>42,896</b>	<b>235</b>
<b>TOTAL.....</b>	<b>86,874</b>	<b>12,173</b>

cubic feet and an actual cut of 12 million cubic feet; 27 per cent of the allowable cut for conifers or softwood species is being utilized. Jack pine is the most extensively utilized species with 41 per cent of the allowable cut being utilized, followed by black and white spruce with 16 per cent under utilization. Small quantities of white and red pine and balsam fir are utilized (fig. 14). As is usual in the forests of Northern Ontario, the hardwood species, poplar and white birch, are utilized to an inappreciable extent.

There are no available records of the amount of wood cut on patented lands in the Gogama district, and therefore no comparison of the actual with the allowable cut can be made.



*Into the smoke . . . to fight a fire that should never have started!*

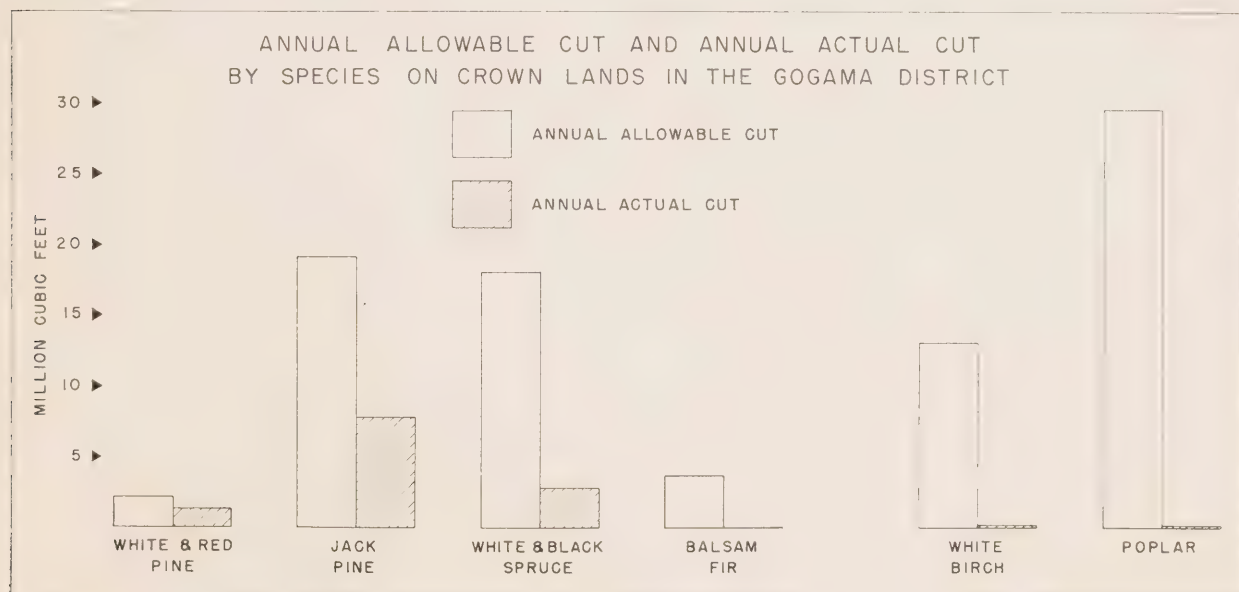


FIGURE 14

# APPENDIX

## *Survey Methods*



● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15,840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs and transferred to base maps.

Aerial photographs for the Gogama district were taken during the summers of 1946, 1947 and 1949. Field sampling was carried out during the summers of 1948 and 1951 by crews who collected all the data necessary for the making of the volume estimates. On the completion of the field work, finished forest type maps were prepared and areas determined by the usual methods.<sup>1</sup>

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and the immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for the three ecological sections in the Gogama district. The per acre volumes in cubic feet, made up in this manner, are shown in tables 18, 19, 20 and 21.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory

of the Gogama district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Gogama district are shown in figure 15.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 26 cubic feet per acre, and for patented land, 29 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

## *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range of from 10 to 120 years, the mature age class from 30 to 200 years, depending on species. Therefore no normal area for each age class can be arrived at.

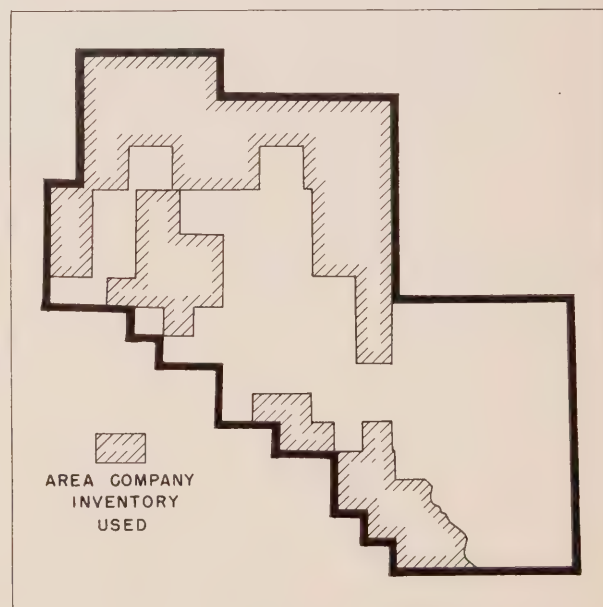


FIGURE 15

<sup>1</sup> A complete statement of the methods used in the forest resources inventory is contained in the Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

## Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class 1b<sup>1</sup> were used as rotations for each species encountered except jack pine where a rotation of 70 years has been accepted as more suitable than that of 60 years (table 16).

TABLE 16. — *Rotation by species.*

Species	Crown and patented land years
White pine.....	120
Red pine.....	100
Jack pine.....	70
White spruce.....	100
Black spruce.....	120
Balsam fir.....	90
White cedar.....	200
Larch.....	100
Hard maple.....	200
Yellow birch.....	150
Ironwood.....	100
White birch.....	80
Poplar.....	50
Red maple.....	70

## Allowable Cut

### (a) METHOD

The following two bases were available for calculation of the allowable cut: 1. the volumes of the mature and immature age classes for each species, and 2. the adopted rotations.

The compilation was carried out in such a way that volumes were shown by species. This suggests the calculation of allowable cut by individual species, separately, rather than for the total primary growing stock in the district, and the method of calculation most suitable to the available data is a volumetric formula.

In view of this, the "French Method of 1883"<sup>2</sup> was considered and found to be satisfactory for the following reasons: 1. The ratio of the volume per acre of mature to immature age class was actually found, so far in Ontario, to be approximately 5/3 required by the French method. 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. 3. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric

methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

### (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5.8 (V.1. + V.2.)}{n/3}$$

where:

V.1. — denotes volume of mature timber (Age Class I)

V.2. — denotes volume of immature timber (Age Class II)

n — denotes rotation

P — denotes annual allowable cut

By application of this formula, the following figures for the annual allowable cut were obtained:

Crown lands	127,844,315 cubic feet
Patented lands	5,500,285 cubic feet
TOTAL.....	133,344,600 cubic feet

This may be regarded as the maximum annual allowable cut for the district, fully justified if need of intensive utilization was substantiated by the present operations in the district. As may be seen from table 14, the actually utilized annual volume was only 12,172,482 cubic feet on Crown lands in the Gogama district.

With rather a moderate demand on wood in view, and with a substantial accumulation of mature timber in the district, an advantageous opportunity arises where, by means of a normal and not the maximum utilization, the normal size of age classes may be obtained. In this way a sound foundation would be created for a balanced sustained yield in the future.

During the period of a gradual normalization of age class areas a portion of mature and over-mature stands will be held over and above their mature age. This involves certain losses in volume of those stands, where growing cull may not be balanced by volume increment of ageing stands. However, these losses are not expected to be of importance.

In view of the foregoing, the calculations of the annual allowable cut for Crown lands, carried out on the French method principles, were brought

<sup>1</sup> Manual of Timber Management, Department of Lands and Forests, Ontario — Part II, page 50.

<sup>2</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris



down to the normal level according to the following procedure :

Productive forest area = 3,333,060 acres  
 Age Class I volume per acre = 2059.08 cubic feet  
 Mean annual increment to the rotation age = 26.15 cubic feet  

$$\text{Average rotation} = \frac{2059.08}{26.15} = 79 \text{ years}$$
  

$$\text{Thus the normal area allotment} = \frac{3,333,060}{79} = 42,191 \text{ acres}$$
  
 Annual allowable cut = 42,191  $\times$  2059.08 = 86,874,645 cubic feet.

The calculations of the annual allowable cut for patented lands, carried out also on the French method principles, were brought down to the normal level as follows :

Productive forest area = 122,236 acres  
 Age Class I volume per acre = 2199.75 cubic feet  
 Mean annual increment to the rotation age = 29.26 cu. ft.  

$$\text{Average rotation} = \frac{2199.75}{29.26} = 75 \text{ years}$$
  

$$\text{Thus the normal area allotment} = \frac{122,236}{75} = 1630 \text{ acres}$$
  
 Annual allowable cut = 1630  $\times$  2199.75 = 3,585,590 cubic feet.

### Cull Factor

Where it was found necessary either to calculate net merchantable volume or to calculate the volume of the primary growing stock when merchantable volumes only were given in company reports, the appropriate cull factors (table 17) were used throughout. These cull factors were taken from the figures for defect, made available from operations being carried out in the district.

TABLE 17. — Cull factors by species, Gogama district.

Species	Cull per cent
White pine.....	25
Red pine.....	25
Jack pine.....	15
White spruce.....	15
Black spruce.....	15
Balsam fir.....	45
White cedar.....	38
White birch.....	30
Poplar.....	38



*Junior Rangers receive instructions, each summer, from experienced Lands and Forests officers, in all branches of ranger operations; 312 were thus employed in 1953.*

*Common and Botanical Names of Tree Species  
included in Timber Estimates*

CONIFERS

White pine.....	<i>Pinus strobus L.</i>
Red pine.....	<i>Pinus resinosa Ait.</i>
Jack pine.....	<i>Pinus banksiana Lamb.</i>
White spruce.....	<i>Picea glauca (Moench) Voss.</i>
Black spruce.....	<i>Picea mariana (Mill.) BSP.</i>
Balsam fir.....	<i>Abies balsamea (L.) Mill.</i>
White cedar.....	<i>Thuja occidentalis L.</i>
Larch.....	<i>Larix laricina (Du Roi) Koch.</i>

HARDWOODS

Hard maple.....	<i>Acer saccharum Marsh.</i>
Yellow birch.....	<i>Betula lutea Michx. f.</i>
Ironwood.....	<i>Ostrya virginiana (Mill.) K. Koch.</i>
Red maple.....	<i>Acer rubrum L.</i>
White birch.....	<i>Betula papyrifera Marsh.</i>
Poplar.....	<i>Populus tremuloides Michx.</i>
	<i>Populus tacamahacca Mill.</i>
	<i>Populus grandidentata Michx.</i>

TABLE 18. — *Volume of the primary growing stock in cubic feet per acre.**Central Transition Section — 1948*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
White pine.....	4" 9" 10" up	3.3 160.6	3.2 159.0	3.1 149.7	4.5 220.4	..... .....	..... .....	..... .....	..... .....
Red pine.....	4"-9" 10" up	5.3 61.2	5.3 60.5	5.0 57.0	..... .....	..... .....	..... .....	..... .....	..... .....
Jack pine.....	4"-9" 10" up	372.9 372.9	369.0 368.9	347.7 347.8	108.3 342.9	618.6 61.2	609.2 60.3	564.2 55.8	199.5 24.7
White spruce.....	4" 9" 10" up	53.8 74.4	53.3 73.6	50.2 69.4	72.0 72.1	45.1 14.3	44.5 14.0	41.2 13.0	44.9 21.1
Black spruce.....	4"-9" 10" up	654.5 134.0	647.6 132.6	610.4 125.0	226.5 88.1	601.9 31.7	592.8 31.2	549.0 28.9	255.7 41.6
Balsam fir.....	4"-9" 10" up	75.6 7.5	74.8 7.4	70.5 7.0	51.1 3.3	60.1 5.9	59.2 5.8	54.8 5.4	46.1 .....
White cedar.....	4"-9" 10" up	89.3 145.8	88.4 144.2	83.3 136.0	52.4 75.5	23.0 16.6	22.6 16.4	20.9 15.2	104.7 18.5
Larch.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	28.2 1.5	27.8 1.5	25.7 1.4	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	1254.7 956.4	1241.6 946.2	1170.2 891.9	514.8 802.3	1376.9 131.2	1356.1 129.2	1255.8 119.7	650.9 105.9
White birch.....	4"-9" 10" up	56.7 50.2	56.1 49.7	52.8 46.9	49.5 84.3	62.1 25.4	61.1 25.0	56.7 23.1	17.6 20.6
Poplar (all).....	4"-9" 10" up	20.5 36.5	20.3 36.1	19.2 34.0	8.0 11.1	34.3 20.1	33.8 19.8	31.3 18.4	..... .....
TOTAL HARDWOODS.....	4"-9" 10" up	77.2 86.7	76.4 85.8	72.0 80.9	57.5 95.4	96.4 45.5	94.9 44.8	88.0 41.5	17.6 20.6
GRAND TOTAL.....	4"-9" 10" up	1331.9 1043.1	1318.0 1032.0	1242.2 972.8	572.3 897.7	1473.3 176.7	1451.0 174.0	1343.8 161.2	668.5 126.5
TOTAL 4" UP.....		2375.0	2350.0	2215.0	1470.0	1650.0	1625.0	1505.0	795.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
Jack pine.....	4"-9" 10" up	23.8 53.1	22.6 50.3	19.4 43.2	..... .....	48.8 76.2	44.1 68.9	33.9 53.1	..... .....
White spruce.....	4"-9" 10" up	53.3 60.2	50.6 57.0	43.4 49.0	..... .....	21.0 14.0	19.0 12.6	14.6 9.8	..... .....
Black spruce.....	4"-9" 10" up	27.4 9.2	26.0 8.7	22.4 7.4	..... .....	23.7 3.8	21.4 3.5	16.4 2.7	20.7 .....
Balsam fir.....	4"-9" 10" up	27.1 9.5	25.7 9.0	22.1 7.7	24.5 .....	27.9 2.1	25.2 1.9	19.4 1.5	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	131.6 132.0	124.9 125.0	107.3 107.3	24.5 .....	121.4 96.1	109.7 86.9	84.3 67.1	20.7 .....
White birch.....	4"-9" 10" up	553.1 285.0	524.4 270.2	450.4 232.0	325.7 554.6	483.8 106.2	437.4 96.0	336.7 73.9	185.8 14.0
Poplar (all).....	4"-9" 10" up	639.6 1918.7	606.4 1819.1	520.8 1562.2	240.9 536.1	1337.1 355.4	1208.7 321.3	930.6 247.4	543.6 135.9
Red maple.....	4"-9" 10" up	..... .....	..... .....	..... .....	68.2 .....	..... .....	..... .....	..... .....	..... .....
TOTAL HARDWOODS.....	4"-9" 10" up	1192.7 2203.7	1130.8 2089.3	971.2 1794.2	634.8 1090.7	1820.9 461.6	1646.1 417.3	1267.3 321.3	729.4 149.9
GRAND TOTAL.....	4"-9" 10" up	1324.3 2335.7	1255.7 2214.3	1078.5 1901.5	659.3 1090.7	1942.3 557.7	1755.8 504.2	1351.6 388.4	750.1 149.9
TOTAL 4" UP.....		3660.0	3470.0	2980.0	1750.0	2500.0	2260.0	1740.0	900.0



TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		Density Class				Density Class			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	5.9 189.2	5.6 182.2	5.2 168.5	433.2	1.5 12.0	1.4 11.1	1.1 8.9	
Red pine.....	4"-9" 10" up	0.4 36.2	0.4 34.8	0.3 32.3					
Jack pine.....	4"-9" 10" up	167.5 311.0	161.2 299.4	149.1 277.0		279.3 164.0	259.4 152.3	206.9 121.5	72.6 42.6
White spruce.....	4"-9" 10" up	95.5 169.7	91.9 163.4	85.0 151.1	44.8 234.9	103.9 55.9	96.5 51.9	77.0 41.4	51.5 30.2
Black spruce.....	4"-9" 10" up	138.0 51.0	132.8 49.1	122.9 45.4	21.6 64.6	215.8 11.4	200.5 10.6	160.0 8.4	80.6 13.1
Balsam fir.....	4"-9" 10" up	103.8 21.2	99.8 20.5	92.4 18.9	130.2 21.2	94.1 7.1	87.5 6.6	69.8 5.2	40.4 3.5
White cedar.....	4"-9" 10" up	18.5 39.4	17.8 37.9	16.5 35.1	41.9 132.6	10.3 7.7	9.5 7.2	7.6 5.7	
TOTAL CONIFERS.....	4"-9" 10" up	529.6 817.7	509.5 787.3	471.4 728.3	238.5 886.5	704.9 258.1	654.8 239.7	522.4 191.1	245.1 89.4
Yellow birch.....	4"-9" 10" up	6.9 38.8	6.6 37.4	6.1 34.6					
White birch.....	4"-9" 10" up	452.5 254.6	435.6 245.1	402.9 226.7	254.1 381.1	480.1 91.4	446.0 84.9	355.7 67.7	197.6 88.8
Poplar (all).....	4"-9" 10" up	237.0 710.9	228.1 684.4	211.0 633.0	181.7 161.1	515.2 200.3	478.5 186.1	381.7 148.4	165.0 74.1
TOTAL HARDWOODS.....	4"-9" 10" up	696.4 1004.3	670.3 966.9	620.0 894.3	435.8 542.2	995.3 291.7	924.5 271.0	737.4 216.1	362.6 162.9
GRAND TOTAL.....	4"-9" 10" up	1226.0 1822.0	1179.8 1754.2	1091.4 1622.6	674.3 1428.7	1700.2 549.8	1579.3 510.7	1259.8 407.2	607.7 252.3
TOTAL 4" UP.....		3048.0	2934.0	2714.0	2103.0	2250.0	2060.0	1667.0	860.0



*Here an Ontario forest protection officer describes the technique of parachuting fire pumps in shock-proof containers, to a group of representatives of woods operators at the Jellicoe forest protection training course, August, 1953.*

TABLE 19. — *Volume of the primary growing stock in cubic feet per acre.*

Central Transition Section — 1951

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	670.9	646.0	488.6	16.7	648.2	630.3	554.0	245.1
	10'' up	549.0	528.6	399.7	87.4	139.4	135.6	119.1	52.7
White spruce.....	4''-9''	37.4	36.0	27.2	81.0	17.1	16.6	14.6	6.5
	10'' up	51.4	49.5	37.5	132.2	10.8	10.5	9.2	4.1
Black spruce.....	4''-9''	812.0	781.9	591.2	42.0	759.4	738.4	648.9	287.2
	10'' up	248.0	238.8	180.6	79.8	88.1	85.7	75.3	33.3
Balsam fir.....	4''-9''	44.8	43.2	32.7	94.7	19.2	18.7	16.4	7.2
	10'' up	5.5	5.3	4.0	.....	0.7	0.7	0.6	0.3
White cedar.....	4''-9''	98.6	94.9	71.8	36.4	36.6	35.6	31.3	13.9
	10'' up	147.2	141.7	107.2	175.1	43.2	42.0	36.9	16.3
Larch.....	4''-9''	17.0	16.3	12.3	.....	46.0	44.6	39.3	17.4
	10'' up	0.8	0.8	0.6	.....	1.9	1.9	1.6	0.7
TOTAL CONIFERS.....	4''-9''	1680.7	1618.3	1223.8	270.8	1526.5	1484.2	1304.5	577.3
	10'' up	1001.9	964.7	729.6	474.5	284.1	276.4	242.7	107.4
White birch.....	4''-9''	94.5	91.0	68.8	41.9	78.9	76.8	67.5	29.8
	10'' up	38.8	37.3	28.2	50.3	10.8	10.5	9.2	4.1
Poplar (all).....	4''-9''	53.8	51.8	39.2	8.5	64.6	62.8	55.2	24.4
	10'' up	91.3	87.9	66.4	.....	29.1	28.3	24.9	11.0
TOTAL HARDWOODS.....	4''-9''	148.3	142.8	108.0	50.4	143.5	139.6	122.7	54.2
	10'' up	130.1	125.2	94.6	50.3	39.9	38.8	34.1	15.1
GRAND TOTAL.....	4''-9''	1829.0	1761.1	1331.8	321.2	1670.0	1623.8	1427.2	631.5
	10'' up	1132.0	1089.9	824.2	524.8	324.0	315.2	276.8	122.5
TOTAL 4'' UP.....		2961.0	2851.0	2156.0	846.0	1994.0	1939.0	1704.0	754.0

SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	59.8	58.4	48.7	.....	94.7	86.9	60.0	22.2
	10'' up	88.3	86.1	71.8	.....	75.6	69.4	47.9	17.7
White spruce.....	4''-9''	26.7	26.1	21.8	40.2	19.1	17.6	12.1	4.5
	10'' up	68.1	66.4	55.4	239.0	27.7	25.4	17.6	6.5
Black spruce.....	4''-9''	33.3	32.5	27.1	109.8	19.4	17.9	12.3	4.6
	10'' up	11.1	10.9	9.1	32.1	4.0	3.6	2.5	0.9
Balsam fir.....	4''-9''	39.1	38.2	31.9	4.5	25.5	23.4	16.1	6.0
	10'' up	5.3	5.2	4.3	.....	2.2	2.0	1.4	0.5
White cedar.....	4''-9''	3.0	2.9	2.4	.....	0.6	0.5	0.4	0.1
	10'' up	8.8	8.7	7.2	.....	1.6	1.5	1.0	0.4
TOTAL CONIFERS.....	4''-9''	161.9	158.1	131.9	154.5	159.3	146.3	100.9	37.4
	10'' up	181.6	177.3	147.8	271.1	111.1	101.9	70.4	26.0
White birch.....	4''-9''	485.6	474.2	395.4	229.2	473.6	434.7	300.1	111.0
	10'' up	307.9	300.6	250.7	423.9	54.4	49.9	34.5	12.7
Poplar (all).....	4''-9''	881.0	860.1	717.4	47.3	1107.1	1016.0	701.5	259.5
	10'' up	943.0	920.7	767.8	.....	223.5	205.2	141.6	52.4
TOTAL HARDWOODS.....	4''-9''	1366.6	1334.3	1112.8	276.5	1580.7	1450.7	1001.6	370.5
	10'' up	1250.9	1221.3	1018.5	423.9	277.9	255.1	176.1	65.1
GRAND TOTAL.....	4''-9''	1528.5	1492.4	1244.7	431.0	1740.0	1597.0	1102.5	407.9
	10'' up	1432.5	1398.6	1166.3	695.0	389.0	357.0	246.5	91.1
TOTAL 4'' UP.....		2961.0	2891.0	2411.0	1126.0	2129.0	1954.0	1349.0	499.0

TABLE 19 — (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	.....	.....	.....	.....	0.8	6.8	0.6	.....
	10" up	.....	.....	.....	.....	28.0	25.5	19.6	.....
Jack pine.....	4"-9"	282.2	256.8	203.4	8.6	592.2	541.6	415.6	.....
	10" up	319.4	290.8	230.2	24.3	124.8	114.1	87.6	.....
White spruce.....	4"-9"	83.5	76.0	60.1	58.7	33.8	30.9	23.7	6.8
	10" up	208.3	189.6	150.2	245.6	33.3	30.5	23.4	9.3
Black spruce.....	4"-9"	154.5	140.6	111.3	44.4	163.0	149.1	114.4	108.3
	10" up	86.1	78.4	62.1	101.6	21.6	19.8	15.2	104.5
Balsam fir.....	4"-9"	87.6	79.7	63.1	21.6	31.0	28.3	21.8	25.9
	10" up	14.7	13.4	10.6	.....	2.6	2.4	1.8	.....
White cedar.....	4"-9"	18.3	16.6	13.2	6.8	5.5	5.0	3.8	20.3
	10" up	56.9	51.9	41.0	51.8	11.3	10.3	8.0	73.5
Larch.....	4"-9"	.....	.....	.....	.....	.....	.....	.....	2.8
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9"	626.1	569.7	451.1	140.1	826.3	755.7	579.9	164.1
	10" up	685.4	624.1	494.1	423.3	221.6	202.6	155.6	187.3
Yellow birch.....	4"-9"	.....	.....	.....	.....	.....	.....	.....	4.1
	10" up	.....	.....	.....	.....	.....	.....	.....	40.0
White birch.....	4"-9"	372.7	339.3	268.6	124.8	308.0	281.7	216.2	94.8
	10" up	355.2	323.3	256.1	253.5	70.9	64.8	49.7	76.7
Poplar (all).....	4"-9"	325.4	296.2	234.6	16.9	738.1	675.0	518.0	104.3
	10" up	643.2	585.4	463.5	69.4	233.1	213.2	163.6	23.1
Red maple.....	4" 9"	.....	.....	.....	.....	.....	.....	.....	5.6
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9"	698.1	635.5	503.2	141.7	1046.1	956.7	734.2	208.8
	10" up	998.4	908.7	719.6	322.9	304.0	278.0	213.3	139.8
GRAND TOTAL.....	4"-9"	1324.2	1205.2	954.3	281.8	1872.4	1712.4	1314.1	372.9
	10" up	1683.8	1532.8	1213.7	746.2	525.6	480.6	368.9	327.1
TOTAL 4" UP.....		3008.0	2738.0	2168.0	1028.0	2398.0	2193.0	1683.0	700.0



Many of Ontario's summer logging camps set up Fire Hazard Warning "meters" to emphasize the ever present risk.



TABLE 20. — Volume of the primary growing stock in cubic feet per acre.

Clay Belt Section — 1948

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9"	27.1	25.9	22.8	.....	345.6	334.4	289.9	207.2
	10" up	3.3	3.2	2.8	.....	14.4	13.9	12.1	8.6
White spruce.....	4"-9"	26.8	25.7	22.6	.....	55.8	54.0	46.8	.....
	10" up	107.3	103.0	90.6	.....	38.8	37.6	32.6	.....
Black spruce.....	4"-9"	1563.2	1500.2	1319.1	626.0	828.4	801.4	695.2	224.9
	10" up	154.6	148.4	130.5	93.5	43.6	42.2	36.6	11.8
Balsam fir.....	4"-9"	280.6	269.2	236.7	186.2	202.8	196.2	170.2	59.0
	10" up	53.4	51.3	45.1	.....	8.4	8.2	7.1	2.5
White cedar.....	4"-9"	15.0	14.4	12.7	126.2	26.5	25.6	22.2	83.2
	10" up	12.8	12.3	10.8	244.9	12.4	12.0	10.4	39.1
Larch.....	4"-9"	6.7	6.4	5.6	.....	22.0	21.3	18.4	.....
	10" up	0.9	0.9	0.8	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9"	1919.4	1841.8	1619.5	938.4	1481.1	1432.9	1242.7	574.3
	10" up	332.3	319.1	280.6	338.4	117.6	113.9	98.8	62.0
White birch.....	4"-9"	10.9	10.4	9.2	.....	40.6	39.2	34.0	.....
	10" up	72.6	69.7	61.3	.....	10.1	9.8	8.5	.....
Poplar (all).....	4"-9"	19.5	18.7	16.4	53.2	15.0	14.5	12.6	6.5
	10" up	175.3	168.3	148.0	.....	25.6	24.7	21.4	11.2
TOTAL HARDWOODS.....	4"-9"	30.4	29.1	25.6	53.2	55.6	53.7	46.6	6.5
	10" up	247.9	238.0	209.3	.....	35.7	34.5	29.9	11.2
GRAND TOTAL.....	4"-9"	1949.8	1870.9	1645.1	991.6	1536.7	1486.6	1289.3	580.8
	10" up	580.2	557.1	489.9	338.4	153.3	148.4	128.7	73.2
TOTAL 4" UP.....		2530.0	2428.0	2135.0	1330.0	1690.0	1635.0	1418.0	654.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9"	.....	.....	.....	.....	6.0	5.8	5.2	2.7
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
White spruce.....	4"-9"	77.5	75.6	68.8	39.5	4.5	4.4	3.9	2.0
	10" up	180.9	176.3	160.4	92.3	.....	.....	.....	.....
Black spruce.....	4"-9"	108.2	105.6	96.1	55.2	15.1	14.7	13.0	6.7
	10" up	27.1	26.4	24.0	13.8	2.9	2.8	2.5	1.3
Balsam fir.....	4"-9"	172.3	167.9	152.8	87.9	26.8	26.0	23.1	11.9
	10" up	57.4	56.0	50.9	29.3	1.7	1.7	1.5	0.8
White cedar.....	4"-9"	3.0	2.9	2.6	1.5	.....	.....	.....	.....
	10" up	1.1	1.1	1.0	0.6	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9"	361.0	352.0	320.3	184.1	52.4	50.9	45.2	23.3
	10" up	266.5	259.8	236.3	136.0	4.6	4.5	4.0	2.1
White birch.....	4"-9"	291.2	284.0	258.3	148.6	103.5	100.6	89.3	46.0
	10" up	291.1	283.9	258.3	148.5	9.0	8.8	7.8	4.0
Poplar (all).....	4"-9"	491.5	479.3	436.0	250.7	1237.4	1203.6	1068.3	550.2
	10" up	2399.7	2340.0	2128.8	1224.1	93.1	90.6	80.4	41.4
TOTAL HARDWOODS.....	4"-9"	782.7	763.3	694.3	399.3	1340.9	1304.2	1157.6	596.2
	10" up	2690.8	2623.9	2387.1	1372.6	102.1	99.4	88.2	45.4
GRAND TOTAL.....	4"-9"	1143.7	1115.3	1014.6	583.4	1393.3	1355.1	1202.8	619.5
	10" up	2957.3	2883.7	2623.4	1508.6	106.7	103.9	92.2	47.5
TOTAL 4" UP.....		4101.0	3999.0	3638.0	2092.0	1500.0	1459.0	1295.0	667.0

TABLE 20 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	.....	.....	.....	.....	325.9 10.1	304.4 9.4	256.7 7.9	.....
White spruce.....	4"-9" 10" up	128.2 238.1	126.8 235.5	113.5 210.8	.....	60.0	56.0	47.3	.....
Black spruce.....	4"-9" 10" up	388.9 85.4	384.7 84.5	344.4 75.6	224.9	222.7 9.3	208.0 8.7	175.4 7.3	266.5
Balsam fir.....	4"-9" 10" up	323.9 138.8	320.4 137.3	286.8 122.9	104.7	165.6 64.4	154.7 60.1	130.4 50.7	156.0 60.7
White cedar.....	4"-9" 10" up	5.9 5.7	5.8 5.6	5.2 5.0	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9" 10" up	846.9 468.0	837.7 462.9	749.9 414.3	329.6	774.2 83.8	723.1 78.2	609.8 65.9	422.5 60.7
White birch.....	4"-9" 10" up	263.6 349.5	260.8 345.6	233.4 309.4	.....	192.6 21.4	179.9 20.0	151.7 16.8	144.4 109.0
Poplar (all).....	4"-9" 10" up	404.9 1523.1	400.5 1506.5	358.5 1348.5	515.0 1094.4	835.2 92.8	780.1 86.7	657.7 73.1	90.4 115.0
TOTAL HARDWOODS.....	4"-9" 10" up	668.5 1872.6	661.3 1852.1	591.9 1657.9	515.0 1094.4	1027.8 114.2	960.0 106.7	809.4 89.9	234.8 224.0
GRAND TOTAL.....	4"-9" 10" up	1515.4 2340.6	1499.0 2315.0	1341.8 2072.2	844.6 1094.4	1802.0 198.0	1683.1 184.9	1419.2 155.8	657.3 284.7
TOTAL 4" UP.....		3856.0	3814.0	3414.0	1939.0	2000.0	1868.0	1575.0	942.0



*Counting the cost of timber and pulpwood destroyed . . . other losses, not so easily calculable, will include wildlife, lost time, profits, wages, purchasing power and property; the influence of which will often be nation wide.*

TABLE 21. — *Volume of the primary growing stock in cubic feet per acre.*

Timagami Section — 1948

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	28.0	27.2	24.6	9.6	48.4	45.2	36.4	.....
	10" up	905.3	878.0	796.5	472.3	82.3	76.9	61.9	.....
Red pine.....	4"-9"	29.4	28.5	25.9	.....	61.7	57.6	46.4	.....
	10" up	706.3	685.0	621.3	.....	114.5	107.0	86.2	.....
Jack pine.....	4"-9"	390.9	379.1	343.9	66.7	590.2	551.5	444.2	228.8
	10" up	260.6	252.8	229.2	171.4	51.3	48.0	38.6	25.4
White spruce.....	4"-9"	44.8	43.5	39.4	39.4	44.8	41.9	33.7	63.4
	10" up	79.6	77.2	70.1	73.1	32.4	30.3	24.4	71.6
Black spruce.....	4"-9"	306.1	296.8	269.3	73.6	441.9	412.9	332.6	95.9
	10" up	107.5	104.3	94.6	25.8	49.1	45.9	36.9	14.3
Balsam fir.....	4"-9"	81.7	79.2	71.9	56.2	76.0	71.0	57.2	126.8
	10" up	6.1	6.0	5.4	.....	3.2	3.0	2.4	.....
White cedar.....	4"-9"	195.1	189.3	171.7	156.6	102.7	95.9	77.3	6.8
	10" up	258.7	250.9	227.6	383.4	65.6	61.3	49.4	5.2
Larch.....	4"-9"	.....	.....	.....	.....	23.6	22.0	17.7	.....
	10" up	.....	.....	.....	.....	0.2	0.2	0.2	.....
TOTAL CONIFERS.....	4"-9"	1076.0	1043.6	946.7	402.1	1389.3	1298.0	1045.5	521.7
	10" up	2324.1	2254.2	2044.7	1126.0	398.6	372.6	300.0	116.5
Hard maple.....	4"-9"	3.7	3.6	3.2	.....	.....	.....	.....	.....
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
Yellow birch.....	4"-9"	.....	.....	.....	.....	.....	.....	.....	.....
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
White birch.....	4"-9"	84.9	82.3	74.6	65.6	45.9	42.9	34.5	44.4
	10" up	138.4	134.3	121.8	262.5	74.9	69.9	56.4	42.6
Poplar (all).....	4"-9"	17.1	16.6	15.1	10.9	47.8	44.6	35.9	24.8
	10" up	15.8	15.4	13.9	7.9	23.5	22.0	17.7	.....
B & W Ash.....	4"-9"	.....	.....	.....	.....	.....	.....	.....	.....
	10" up	.....	.....	.....	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9"	105.7	102.5	92.9	76.5	93.7	87.5	70.4	69.2
	10" up	154.2	149.7	135.7	270.4	98.4	91.9	74.1	42.6
GRAND TOTAL.....	4"-9"	1181.7	1146.1	1039.6	478.6	1483.0	1385.5	1115.9	590.9
	10" up	2478.3	2403.9	2180.4	1396.4	497.0	464.5	374.1	159.1
TOTAL 4" UP.....		3660.0	3550.0	3220.0	1875.0	1980.0	1850.0	1490.0	750.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	5.4	5.2	4.7	19.0	7.0	6.5	5.2	.....
	10" up	128.5	125.1	113.9	81.0	51.3	47.7	38.3	.....
Red pine.....	4"-9"	.....	.....	.....	30.7	.....	.....	.....	.....
	10" up	.....	.....	.....	97.2	.....	.....	.....	.....
Jack pine.....	4"-9"	.....	.....	.....	.....	21.1	19.6	15.8	.....
	10" up	.....	.....	.....	.....	14.6	13.6	10.9	.....
White spruce.....	4"-9"	11.4	11.1	10.1	9.7	28.8	26.8	21.5	.....
	10" up	83.8	81.5	74.2	44.4	27.6	25.7	20.7	.....
Black spruce.....	4"-9"	5.2	5.1	4.7	.....	8.9	8.4	6.6	.....
	10" up	0.7	0.7	0.6	.....	0.5	0.4	0.4	.....
Balsam fir.....	4"-9"	34.3	33.3	30.3	.....	19.5	18.0	14.6	.....
	10" up	1.4	1.4	1.3	.....	1.2	1.2	0.9	.....
White cedar.....	4"-9"	5.1	4.9	4.5	.....	.....	.....	.....	.....
	10" up	9.8	9.6	8.7	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9"	61.4	59.6	54.3	59.4	85.3	79.3	63.7	.....
	10" up	224.2	218.3	198.7	222.6	95.2	88.6	71.2	.....
Hard maple.....	4"-9"	159.3	155.0	141.1	.....	31.5	29.3	23.5	.....
	10" up	295.9	287.9	262.1	.....	19.3	18.0	14.4	.....
Yellow birch.....	4"-9"	51.1	49.8	45.3	.....	6.8	6.4	5.1	.....
	10" up	517.1	503.1	458.0	.....	42.1	39.1	31.4	.....
Ironwood.....	4"-9"	3.0	2.9	2.6	.....	.....	.....	.....	.....
	10" up	.....	.....	.....	.....	.....	.....	.....	.....



TABLE 21 (Cont'd)

SPECIES	D.B.H.	HARDWOOD MATURE (H-I) (Cont'd)				HARDWOOD IMMATURE (H-II) (Cont'd)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White birch.....	4"-9" 10" up	134.2 475.7	130.6 462.9	118.8 421.4	158.3 61.5	508.1 89.7	473.0 83.5	379.8 67.0	137.2 197.4
Poplar (all).....	4"-9" 10" up	185.3 844.0	180.3 821.4	164.1 747.6	865.0 273.2	791.6 210.4	736.9 195.9	591.6 157.3	380.4
Red maple.....	4"-9" 10" up	13.1 10.7	12.8 10.4	11.6 9.4	.....	.....	.....	.....	.....
TOTAL HARDWOODS.....	4"-9" 10" up	546.0 2143.4	531.4 2085.7	483.5 1898.5	1023.3 334.7	1338.0 361.5	1245.6 336.5	1000.0 270.1	517.6 197.4
GRAND TOTAL.....	4"-9" 10" up	607.4 2367.6	591.0 2304.0	537.8 2097.2	1082.7 557.3	1423.3 456.7	1324.9 425.1	1063.7 341.3	517.6 197.4
TOTAL 4" UP.....		2975.0	2895.0	2635.0	1640.0	1880.0	1750.0	1405.0	715.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	18.7 354.9	18.3 347.1	16.5 314.3	23.8 452.2	94.1 174.7	90.7 168.5	76.6 142.3	5.7 185.1
Red pine.....	4"-9" 10" up	11.1 211.3	10.9 206.6	9.8 187.1	21.7 195.3	14.3 69.7	13.8 67.2	11.6 56.8	.....
Jack pine.....	4"-9" 10" up	44.8 121.2	43.8 118.6	39.7 107.3	.....	112.5 84.9	108.5 81.8	91.6 69.1	.....
White spruce.....	4"-9" 10" up	75.9 161.3	74.2 157.8	67.2 142.8	63.8 74.8	141.1 26.9	136.1 25.9	114.9 21.9	48.2 36.4
Black spruce.....	4"-9" 10" up	50.9 14.3	49.8 14.0	45.0 12.7	60.7 10.7	108.2 9.4	104.3 9.1	88.1 7.7	56.9 26.8
Balsam fir.....	4"-9" 10" up	105.2 10.4	102.9 10.2	93.2 9.2	32.2	78.6 3.3	75.8 3.2	64.0 2.7	86.4
White cedar.....	4"-9" 10" up	71.2 151.2	69.6 147.9	63.0 133.9	7.0	25.9 20.3	24.9 19.6	21.1 16.5	6.9 14.7
TOTAL CONIFERS.....	4"-9" 10" up	377.8 1024.6	369.5 1002.2	334.4 907.3	209.2 733.0	574.7 389.2	554.1 375.3	467.9 317.0	204.1 263.0
Hard maple.....	4"-9" 10" up	28.0 37.2	27.4 36.4	24.8 32.9	.....	16.3 2.6	15.6 2.6	13.2 2.2	26.7 7.5
Yellow birch.....	4"-9" 10" up	23.7 272.8	23.2 266.8	21.0 241.5	.....	7.9 6.8	7.7 6.5	6.5 5.5	.....
White birch.....	4"-9" 10" up	241.1 562.5	235.8 550.1	213.4 498.0	167.8 131.8	398.4 170.7	384.2 164.6	324.4 139.0	112.9 184.1
Poplar (all).....	4"-9" 10" up	127.1 270.2	124.4 264.2	112.5 239.2	94.9 63.3	325.4 208.0	313.8 200.6	264.9 169.4	43.7 58.0
TOTAL HARDWOODS.....	4"-9" 10" up	419.9 1142.7	410.8 1117.5	371.7 1011.6	262.7 195.1	748.0 388.1	721.3 374.3	609.0 316.1	183.3 249.6
GRAND TOTAL.....	4"-9" 10" up	797.7 2167.3	780.3 2119.7	706.1 1918.9	471.9 928.1	1322.7 777.3	1275.4 749.6	1076.9 633.1	387.4 512.6
TOTAL 4" UP.....		2965.0	2900.0	2625.0	1400.0	2100.0	2025.0	1710.0	900.0



## *Notes*

---





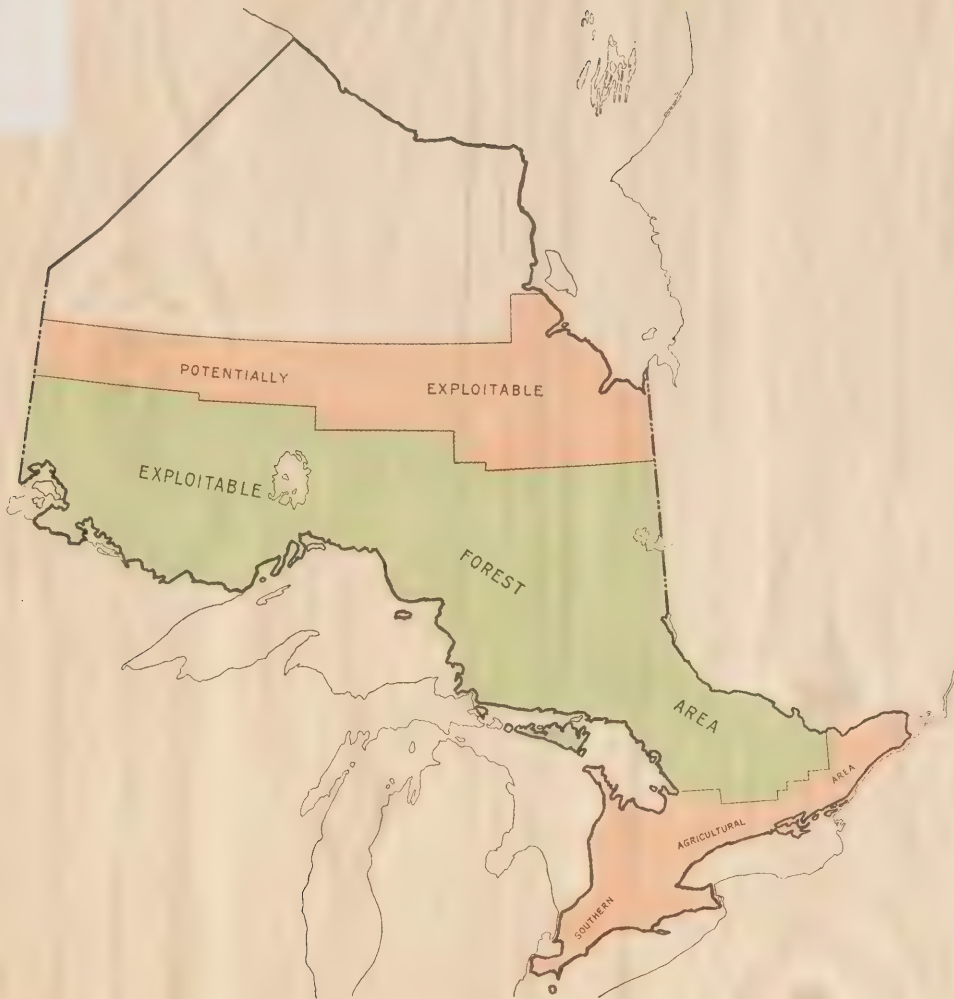


**Hon. Welland S. Gemmell**  
*Minister*

**F. A. MacDougall**  
*Deputy Minister*

Report No. 14 of the  
**FORT FRANCES DISTRICT**

CAZON  
LF  
- F 56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management

Ontario Department of Lands and Forests





# *Forest Resources Inventory*

— 1953 —

Report No. 14 of the  
**FORT FRANCES DISTRICT**



Division of Timber Management  
**Ontario Department of Lands and Forests**

# PREFACE

● Within the past decade, forestry in Ontario has been undergoing a transition from the old economy into a new, more stable one. The old economy was one of forest liquidation. History teaches us that as population increased, the necessity for cleared land grew. In the pioneering stage of development the abundance of trees made wood excessively cheap and encouraged extravagance. Throughout most of the nation's history, wood-dependent industries have drawn on virgin forests, a stockpile of raw material prepared and waiting for them. That economy now is coming to a close.

The administration of timber lands is passing into a new phase — the economy of tree growing — a phase in which dollar costs are incurred in timber production. Emergence into the new forest economy has been accompanied by unprecedented progress in the protection of forests from destructive agencies; the opportunity for utilizing inferior species and materials; an increase in wood prices through reduction of natural supplies on which no cost of production need be charged; the development of a desire for permanent investment instead of speculative ones; and an extension of government functions leading to the practice of forestry by the state on a large scale. When forestry is to be practised as an independent industry, it becomes desirable, as in any large business undertaking, to plan, organize and manage the business so as to secure, continuously and systematically, a regular, nearly equal annual yield.

The forest exploiter also plans and organizes his business for annual returns, not, however, to be derived continuously from the same ground; he seeks a new field of exploitation, changing the location as soon as the accumulated stores of wood in the virgin forests have been exhausted. The forest property is then abandoned and devoted to purposes other than wood production, or if unsuitable for other than forest production, may remain barren over long periods.

The business of forestry is based upon the conception of what is technically called the "sustained yield," a continued systematic use of the same property for wood-crops, the best and largest possible. This is secured by proper attention to silviculture, replacement of the harvested crop, and protecting and tending it until ready for harvesting again. Finally, when the industry is fully established, this sustained yield is annually derived as far as practicable in equal or nearly equal amounts forever, under an "annual sustained yield management."

In order to secure the data upon which sustained yield management may be brought about, a forest survey is necessary. In 1946, Ontario set in motion plans for carrying out a forest resources inventory covering the exploitable forest area of the Province. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to the Province one half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources, the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these forest administrative districts, totalling 172,000 square miles, and comprising the accessible forest area of Ontario. This report, the fourteenth in the series, deals with the results of the inventory in the Fort Frances district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the Province as a whole. This objective may be attained most effectively through the use of the comprehensive forest resources data in the preparation of long term timber management plans.

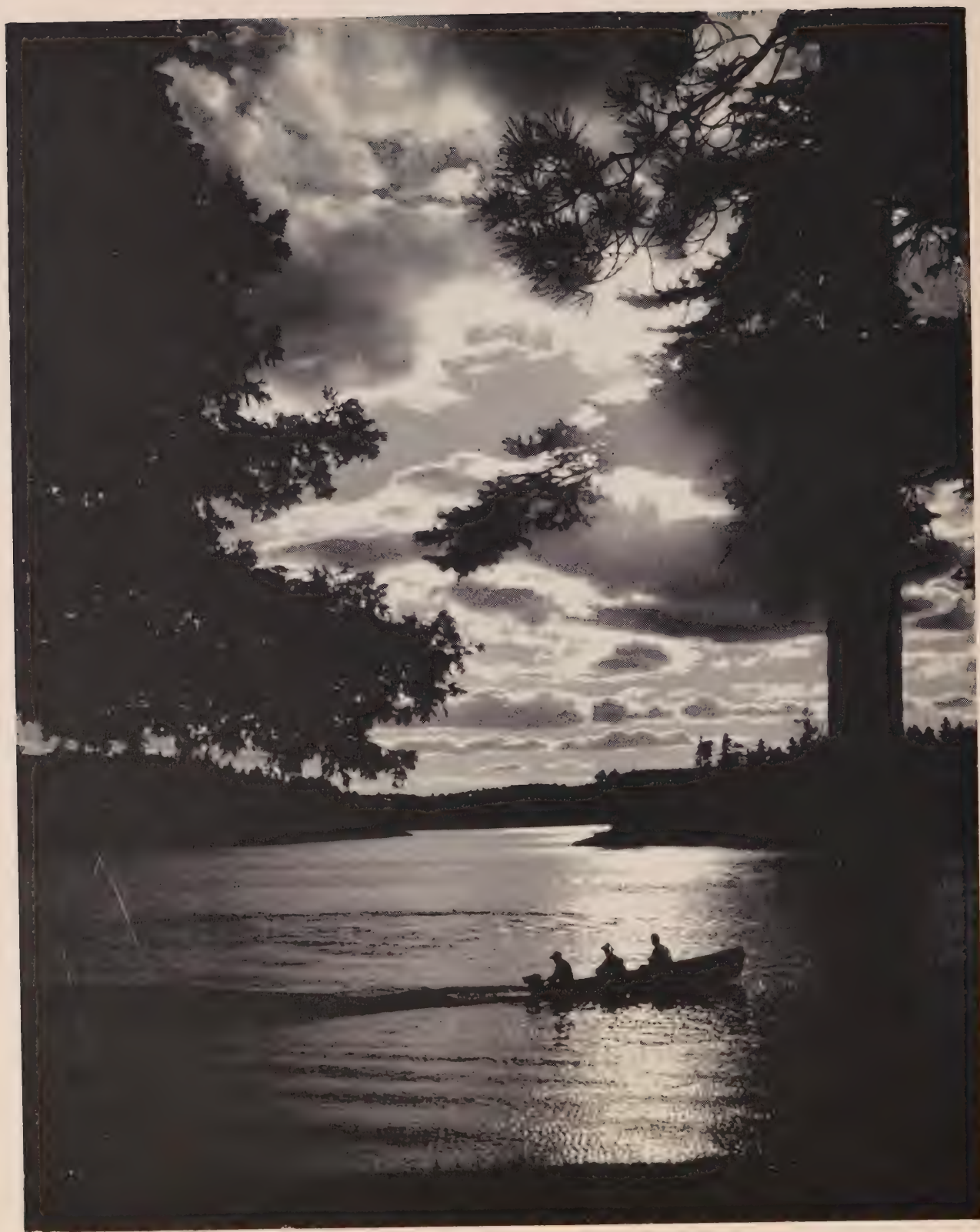
# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	23
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	25
AREAS.....	9	APPENDIX.....	27
FOREST LAND OWNERSHIP.....	10	SURVEY METHODS.....	27
AGE CLASSES.....	11	MEAN ANNUAL INCREMENT.....	27
REGIONAL FOREST TYPES.....	12	AGE CLASSES.....	27
COVER TYPES.....	13	ROTATION.....	28
VOLUME.....	15	ALLOWABLE CUT.....	28
CONIFERS VS. HARDWOODS.....	15	CULL FACTOR.....	29
SAWLOGS VS. PULPWOOD.....	17		

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES.....	9	FIG. 10 — VOLUME OF PRIMARY GROWING STOCK ON PATENTED LANDS BY SIZE CLASSES.....	17
FIG. 2 — LAND OWNERSHIP WITHIN THE FORT FRANCES DISTRICT.....	10	FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF CONIFEROUS SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	18
FIG. 3 — FORT FRANCES DISTRICT, 1953.....	10	FIG. 12 — VOLUME OF PRIMARY GROWING STOCK OF PRINCIPAL HARDWOOD SPECIES ON CROWN LANDS BY AGE CLASSES AND SIZE CLASSES.....	18
FIG. 4 — CLASSIFICATION OF FORESTS ON CROWN LAND INTO AGE CLASSES.....	12	FIG. 13 — VOLUME OF THE PRIMARY GROWING STOCK OF PRINCIPAL SPECIES ON PATENTED LANDS BY AGE CLASSES AND SIZE CLASSES.....	19
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	12	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON CROWN LANDS IN THE FORT FRANCES DISTRICT.....	24
FIG. 6 — VOLUME OF THE PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	15	FIG. 15 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LANDS.....	25
FIG. 7 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LANDS BY SPECIES AND AGE CLASSES...	16	FIG. 16 — AREA COMPANY INVENTORY USED.....	28
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	17		
FIG. 9 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LANDS BY SIZE CLASSES.....	17		





# SURVEY HIGHLIGHTS

1. The Fort Frances district lies in the north-western section of Ontario. The southern boundary separates Canada from the State of Minnesota, United States of America, and the westerly limit is marked, in part, by the Manitoba-Ontario boundary. An area of fertile agricultural land, now supporting a thriving farming community, comprising about 100,000 acres is located between Lake of the Woods and Rainy lake in the westerly portion of the district. Nearly one-fifth of the total area of the district is covered by water which has contributed to recreational use of the forests. Quetico Provincial Park, located in the southeasterly portion of the district, is a well known and much frequented summer resort area.

2. The total area of the Fort Frances district is 4,489,514 acres, 7,015 square miles. Productive forest lands occupy 3,057,742 acres, 68 per cent of the total area. Water covers 19 per cent of the total area and 9 per cent is non-productive forest, the balance being non-forested lands.

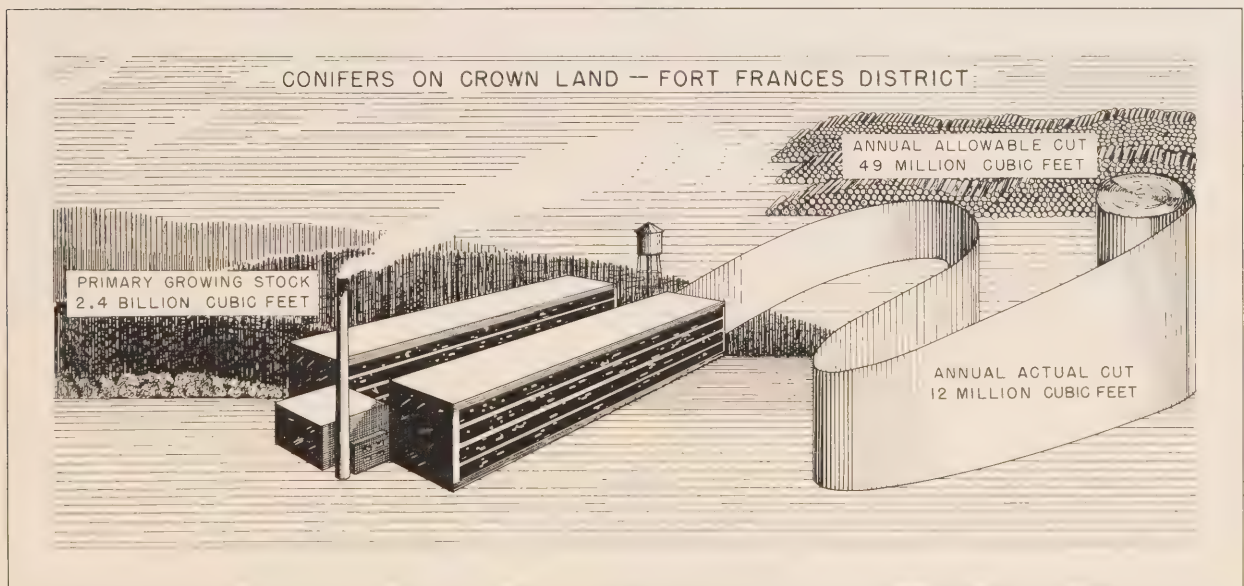
3. Patented or privately owned lands cover 11

per cent of the total area, leaving the major portion of the district in Crown ownership.

4. The total timber resources of the district are over 4 billion cubic feet, 61 per cent is of the valuable coniferous species and 39 per cent hardwoods. Jack pine and black spruce are the main conifers, with jack pine predominating. Of the once extensive white and red pine stands little now remains, and most of the area on which they originally grew is occupied by jack pine and poplar.

5. The annual allowable cut for conifers on Crown lands is 49 million cubic feet, over one half of which is jack pine. Poplar with an allowable cut of 41 million cubic feet is the only numerically important hardwood.

6. The actual cut for conifers is 12 million cubic feet, 24 per cent of the allowable cut on Crown lands. The cut of jack pine was 27 per cent of the allowable cut, spruce 29 per cent and 26 per cent for red and white pine. Only 6 per cent of the allowable cut for hardwood species on Crown lands was utilized.





MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
10 20 30 40 50 60 70 80 90 100

MARCH, 1933





*Forest resources inventory photograph of the Town of Fort Frances, taken with a six-inch focal length aerial camera from an altitude of 7,920 feet. Scale of photograph: 4 inches to the mile.*



# FOREST INVENTORY

## Areas

● The total area of the Fort Frances district excluding Indian Reserve lands is 4,489,514 acres (table 1), 7,015 square miles. Water covers an area of 846,600 acres, or 19 per cent of the total area, leaving a net land area of 3,642,914 acres. Non-productive forest lands, including lands which appear to be permanently unfit for commercial timber production due to very low productivity, occupy 426,194 acres, or 9 per cent of the total area (fig. 1). Non-forested lands, comprising lands permanently withdrawn from timber production, make up 158,978 acres, or 4 per cent of the total area. In this classification are the important developed agricultural lands amounting to 103,314 acres, pasture lands

TABLE 1. — Total area classification into broad land and ownership groupings.

Kind of area	Crown land acres	Patented land acres	Total acres
Productive forest land <sup>1</sup> .....	2,779,244	278,498	3,057,742
Non-forested land <sup>2</sup>			
Developed agricultural land.....	2,092	101,222	103,314
Grass and meadow land.....	3,028	10,034	13,062
Non-reproducing burn.....	874		874
Unclassified land <sup>3</sup> .....	27,673	14,055	41,728
TOTAL.....	33,667	125,311	158,978
Non-productive forest <sup>4</sup>			
Open muskeg.....	82,351	27,008	109,359
Treed muskeg (scrub).....	135,403	19,528	154,931
Brush, alder, and flooded land...	98,333	44,965	143,298
Rock outcrop.....	15,221	1,558	16,779
Barrens.....	1,827		1,827
TOTAL.....	333,135	93,059	426,194
Water.....	846,600		846,600
TOTAL AREA.....	3,992,646	496,868	4,489,514

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.

totalling 13,062 acres, a small area of 874 acres of non-reproducing burn and 41,728 acres of unclassified lands including lands occupied by cities,

towns, villages, roads and railroads or otherwise withdrawn from forest production.

The Fort Frances district is essentially a timber producing area with 3,057,742 acres, or 68 per cent of the total area, classified as productive forest land (fig. 1). Lying between Rainy lake and Lake of the Woods in the westerly part of the district is an area of a little over 100,000 acres of fertile agricultural lands located on soils laid down in post-glacial Lake Agassiz. These fertile agricultural

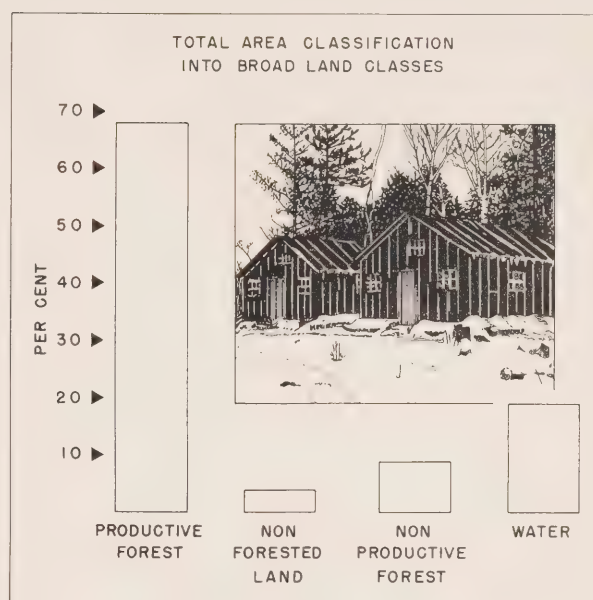


FIGURE 1

soils have a sharply defined boundary separating them from the thin rocky soils of the Pre-Cambrian formation covering the major part of the district.

The district originally contained some of the finest red and white pine stands in Ontario. Over the past fifty years these virgin forests have been intensively operated for sawlogs to support a thriving sawmilling industry. Owing to the exhaustion of the virgin red and white pine stands, the sawmilling industry has turned to jack pine which is abundant in the district. One large pulp and paper plant situated in the town of Fort Frances is dependent on the spruce resources of the district.

The large areas of inland water, covering nearly one-fifth of the total area, have contributed to the extensive development for recreational use of the forests of the district. Quetico Provincial Park,



covering an area of 1,720 square miles in the south-easterly portion of the district, is one of the best known resort areas on the continent.



### Forest Land Ownership

It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement, and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort, and for other uses. All of these various

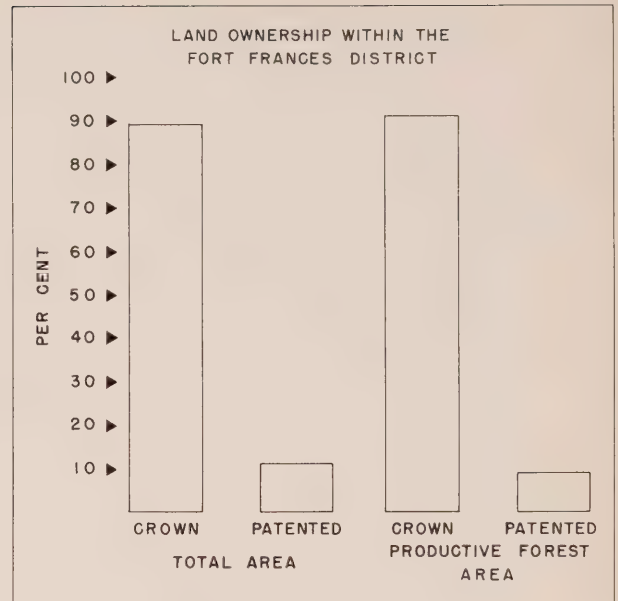
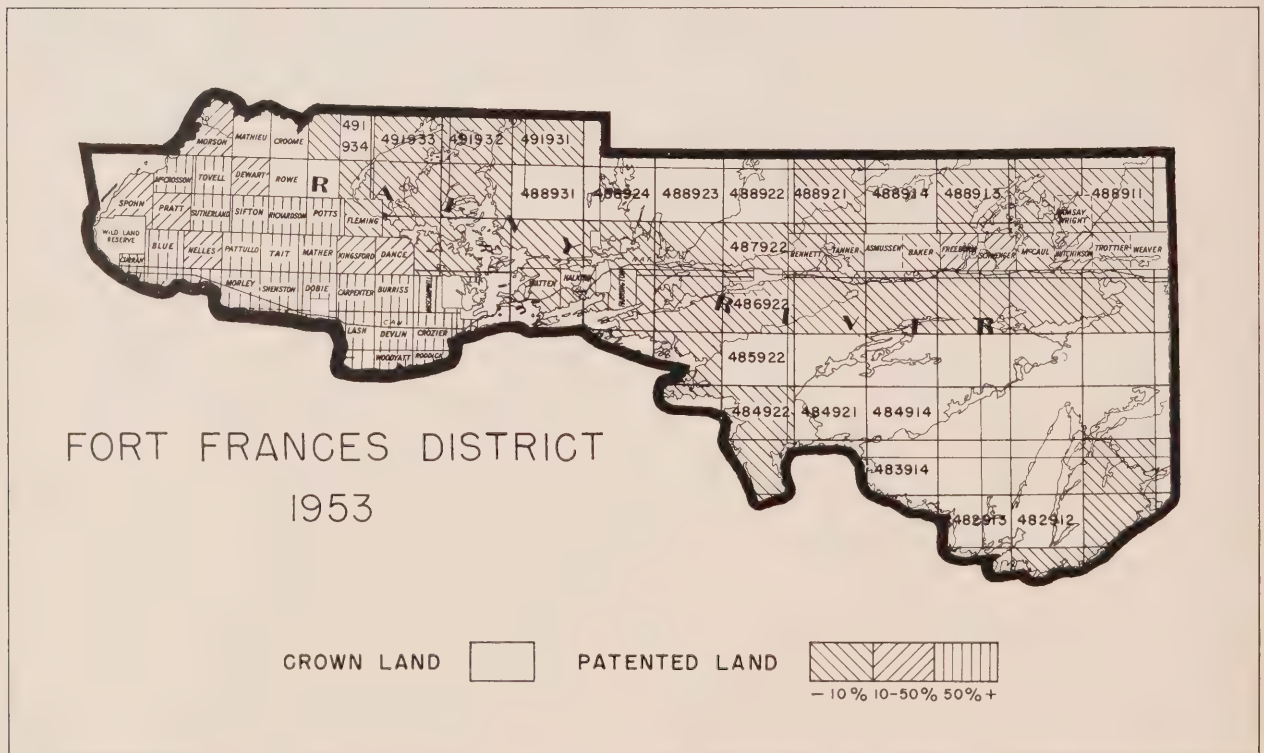


FIGURE 2

types of ownership are grouped under "Patented Lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario to reserve all pine timber to

FIGURE 3



the Crown at time patent is issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands presents, therefore, a complicated picture. In the course of the inventory no attempt has been made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

Of the total area of the Fort Frances district of 4,489,514 acres, 3,992,646 acres are in the ownership of the Crown and 496,868 acres are patented lands (table 1); 89 per cent of the total area is Crown land and 11 per cent is patented land (fig. 2). Considering only the productive forest lands, totaling 3,057,742 acres, 91 per cent is in Crown ownership and 9 per cent is patented land.

The main part of the patented lands lies in the rich farming area located south and east of Lake of the Woods where some twenty townships are almost wholly patented lands forming a consolidated agricultural community. The balance of the patented lands is in small summer resort, mining and other private holdings scattered sparsely throughout the district (fig. 3).



*Age Classes*

In simplest terms, the normal forest is a forest in such condition that it is possible to harvest annually, forever, the best attainable product; or to secure continuously the largest possible revenue. The actual forest, under natural conditions, will be found abnormal in some one direction or in several directions, and quite frequently has an age class distribution preventing equal areas or volumes being harvested each year.

While we have assumed, for the sake of simplicity that the stands of different age, the age classes, are separate in area the one from the other, it is readily conceivable that all or some of them may be mixed together on the same area as in the selection forest, where all age classes from seedling to the matured

timber are mingled; and if there are enough trees in gradation from the older to the younger, allowing for losses, so that the younger age class can replace in amount the older as it is removed or grows out of its class, we would have arrived at the normal condition for the selection forest. The assessment of the normalcy of age class distribution is to some degree dependent on whether even-aged or selection forest management is to prevail.

Of the total productive area of 3,057,742 acres in the Fort Frances district, 953,103 acres or 31 per cent is mature; 1,490,218 acres or 49 per cent is immature; 599,437 acres or 20 per cent is young growth; and 14,984 acres or less than one per cent is reproducing forest (table 2).

TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	369,638	8,622	378,260	12
Hardwood.....	88,611	31,184	119,795	4
Mixedwoods.....	411,997	43,051	455,048	15
TOTAL.....	870,246	82,857	953,103	31
Immature forest:				
Coniferous.....	648,489	20,799	669,288	22
Hardwood.....	180,916	28,398	209,314	7
Mixedwoods.....	571,150	40,466	611,616	20
TOTAL.....	1,400,555	89,663	1,490,218	49
Young growth:				
Coniferous.....	92,552	1,942	94,494	3
Hardwood.....	187,166	55,220	242,386	8
Mixedwoods.....	217,709	44,848	262,557	9
TOTAL.....	497,427	102,010	599,437	20
Reproducing forest.....	11,016	3,968	14,984	*
TOTAL PRODUCTIVE FOREST.....	2,779,244	278,498	3,057,742	100

\*Less than one per cent

The age class distribution on Crown lands with a total area of 2,779,244 acres is similar to the productive forest area with: 870,246 acres or 31 per cent mature; 1,400,555 acres or 50 per cent immature; 497,427 acres or 18 per cent young growth and an inappreciable area of 11,016 acres or one per cent classified as reproducing forest (fig. 4).

Patented lands which occupy 278,498 acres show:

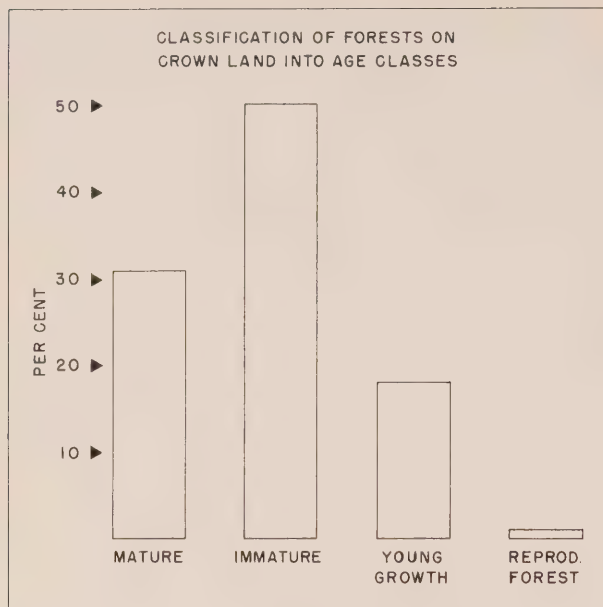


FIGURE 4

30 per cent mature, 32 per cent immature and 38 per cent of the patented area classified as young growth and reproducing forest.



### *Regional Forest Types*

White and red pine are the most valuable commercial species in the Algonquin and Timagami regions or sections in eastern Ontario. In the Algonquin section white pine is in competition with the two main tolerant hardwood species, hard maple and yellow birch, which tends to limit the stands of pure or relatively pure pine to the dry sites. Many of the best growing sites are occupied by the tolerant hardwoods. In the Timagami section, lying north of the Algonquin section, white and red pine tend to grow in pure stands on all of the better sites, in the absence of intense competition from tolerant hardwoods.

The continuity of the distribution of white and

red pine stands in a westerly direction is broken by Lake Superior. However, on the west side of Lake Superior white and red pine stands appear again in the southerly part of the Port Arthur district, and extend to the westerly boundary of the province in the Fort Frances district. White and red pine stands in the Fort Frances district resemble fairly closely similar stands in the Timagami section of eastern Ontario. In the west, hard maple and yellow birch are represented only by rare outliers. Other tolerant hardwoods and hemlock of the eastern forest are likewise very scarce, while Manitoba and silver maple, common in the northern part of the prairie provinces, are found regularly on flats along the river courses.

An interesting explanation has been put forth to account for the origin and structure of white and red pine stands in western Ontario. During the most recent glacial period, when all of Ontario was covered by an ice sheet, three areas of refuge were available to white and red pine: the eastern continental shelf, the Appalachian mountains, and the driftless area of Wisconsin. Because it was unglaciated, this last area formed a suitable refuge for red and white pine, as well as other forest tree species. Following the retreat of the ice sheet, according to this theory, the pine of western Ontario resulted from migrations northward from the Wisconsin driftless area, and the pine of eastern Ontario resulted from migrations from the east and south.

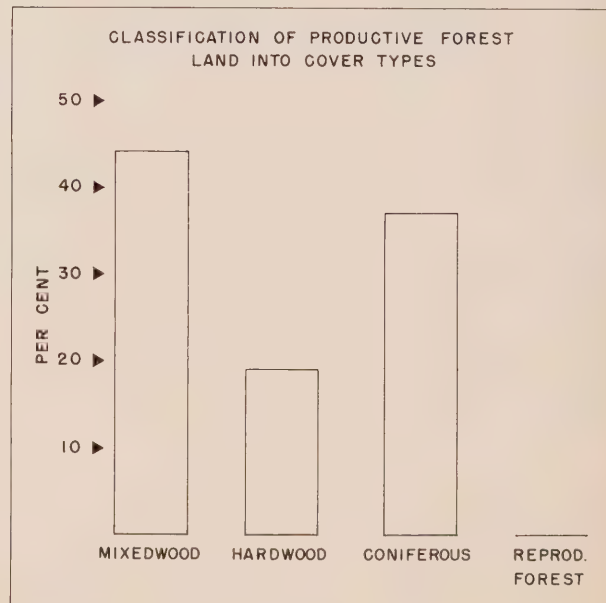
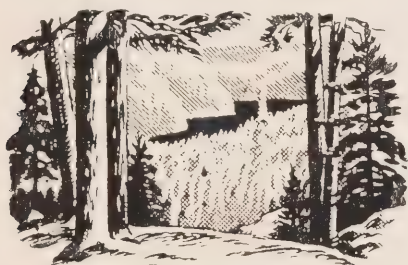


FIGURE 5



Although tolerant hardwoods were also present in the areas of refuge, their minor importance in the forests of the Timagami section and western Ontario is probably due to unfavourable temperature and moisture conditions.

The Fort Frances district is wholly within the Quetico region or section, which is characterized by the presence of white and red pine in consolidated commercial stands in the virgin forest. Black and white spruce are important components, along with jack pine and balsam fir. Poplar and white birch are the only important hardwoods. The red and white pine have been cut during the past fifty years, and the country has had a tragic fire history. White and red pine have not reproduced on the cut-over and burned areas; jack pine has replaced them, and now, along with poplar, forms over one half of the growing stock of the district.



*Cover Types*

The forests of the Fort Frances district are made up of 14 commonly recorded tree species. Seven species make up 93 per cent of the total wood volume. Jack pine is the most important conifer from the standpoint of occurrence making up 24 per cent of the total wood volume. Black spruce forms 15 per cent of the total volume, followed by white and red pine, forming 9 per cent, balsam fir is 7 per cent, white spruce 3 per cent. The balance of 3 per cent is made up of small quantities of white cedar and larch. Poplar is the most important hardwood or broadleaved species forming 30 per cent of the total volume, followed by white birch with 8 per cent; the balance of one per cent is made up of a miscellaneous group of broadleaved species.

The forests of the district are separated into three main cover types: coniferous, hardwood and mixedwoods. The coniferous type contains 75 per cent or more conifers or softwood trees, and the hardwood type contains 75 per cent or more hardwood

or broadleaved trees. All other combinations are classed as mixedwoods. Reproducing forest includes all areas of young growth which have not attained a sufficiently stable or complete composition to be classified into types on the basis of composition.

Over the district as a whole the mixedwoods type prevails, occupying 1,329,221 acres, or 44 per cent of the productive forest area (table 3). The coniferous type occupies 37 per cent and the hardwood type 19 per cent of the productive forest. Reproducing forest occupies less than one per cent of the productive area (fig. 5).

The distribution of cover types on Crown lands is similar to the total productive forest, with 43 per cent mixedwoods, 40 per cent coniferous, 17 per cent hardwood, and an inappreciable area of reproducing forest.

On patented lands there is an increase in the proportion of the hardwood cover type. The distribution for patented lands shows: 46 per cent mixedwoods, 41 per cent hardwood, 12 per cent coniferous; reproducing forest occupies one per cent of the patented area.

TABLE 3. — *Classification of productive forest lands into cover types.*

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	369,638	13	8,622	3	378,260	12
Immature.....	648,489	24	20,799	8	669,288	22
Young growth.....	92,552	3	1,942	1	94,494	3
TOTAL.....	1,110,679	40	31,363	12	1,142,042	37
Hardwood type:						
Mature.....	88,611	3	31,184	11	119,795	4
Immature.....	180,916	7	28,398	10	209,314	7
Young growth.....	187,166	7	55,220	20	242,386	8
TOTAL.....	456,693	17	114,802	41	571,495	19
Mixedwoods type:						
Mature.....	411,997	15	43,051	15	455,048	15
Immature.....	571,150	20	40,466	15	611,616	20
Young growth.....	217,709	8	44,848	16	262,557	9
TOTAL.....	1,200,856	43	128,365	46	1,329,221	44
Reproducing forest.....	11,016	*	3,968	1	14,984	*
TOTAL PRODUCTIVE FOREST.....	2,779,244	100	278,498	100	3,057,742	100

\* Less than one per cent.







### Volume

The volume of the primary growing stock includes all living trees, 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Fort Frances district is just over 4 billion cubic feet (4,041,760,100 cubic feet). This is an average of 1,322 cubic feet per acre (table 4). The mature age class contains 1.9 billion cubic feet (table 5) or 2,013 cubic feet per acre, while the immature age class contains 2.1 billion cubic feet or 1,425 cubic feet per acre (fig. 6).

TABLE 4. — *Volume per acre of the primary growing stock.*

	Crown land			Patented land			Average Total
	4"-9" d.b.h.	10" + d.b.h.	Average	4"-9" d.b.h.	10" + d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1,033	1,010	2,043	809	887	1,696	2,013
Immature.....	1,052	377	1,429	968	402	1,370	1,425
Productive forest.....	854	506	1,360	552	393	945	1,322

Crown lands within the district support a volume of 3,778 million cubic feet (table 6) or an average of 1,360 cubic feet per acre. The mature age class contains 1,778 million cubic feet or 2,043 cubic feet per acre. The immature age class on Crown lands contains 2,000 million cubic feet or 1,429 cubic feet per acre (fig. 6).

Patented lands in the district cover only 9 per cent of the total productive forest area. They contain a total of 263 million cubic feet or 945 cubic feet per acre (table 7). Of this volume, 140 million cubic

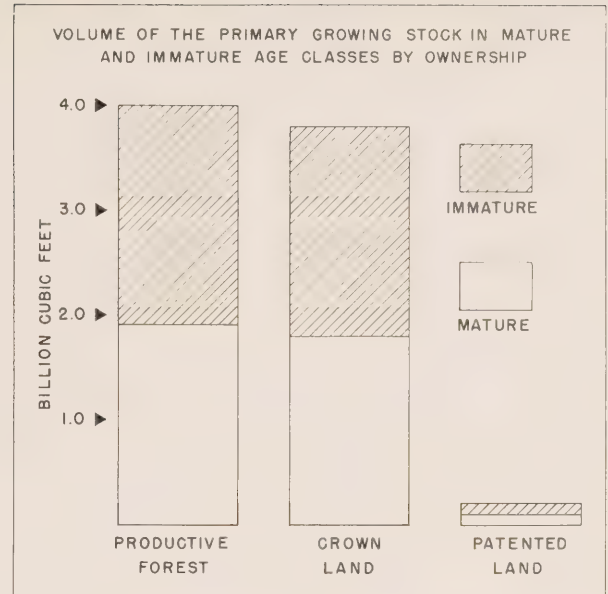


FIGURE 6

feet, or 1,696 cubic feet per acre, are in the mature age class and 123 million cubic feet, or 1,370 cubic feet per acre are in the immature age class.

### Conifers vs. Hardwoods

The volume of the primary growing stock on productive forest land in the Fort Frances district is composed mainly of softwoods, or coniferous species. This group contains 2,470 million cubic feet, or 61 per cent of the total volume; and the hardwood group contains 1,572 million cubic feet, or 39 per cent of the total volume (table 8). In the mature age class conifers with 1,133 million cubic feet comprise 59 per cent of the mature volume, and hardwoods with 786 million cubic feet make up 41 per cent of the mature volume. The immature age class has 1,337 million cubic feet or 63 per cent of the volume in the coniferous group, and 786 million cubic feet or 37 per cent is hardwoods.

On Crown lands the coniferous volume is 2,357 million cubic feet or 62 per cent of the total volume. Hardwoods amount to 1,422 million cubic feet, making up 38 per cent of the total volume on Crown lands (table 9). In the mature age class on Crown lands conifers with 1,079 million cubic feet comprise 61 per cent of the mature volume, while hardwoods with 699 million cubic feet make up 39 per cent of the volume. In the immature age class on Crown lands, 64 per cent of the volume is conifers and 36 per cent hardwoods.



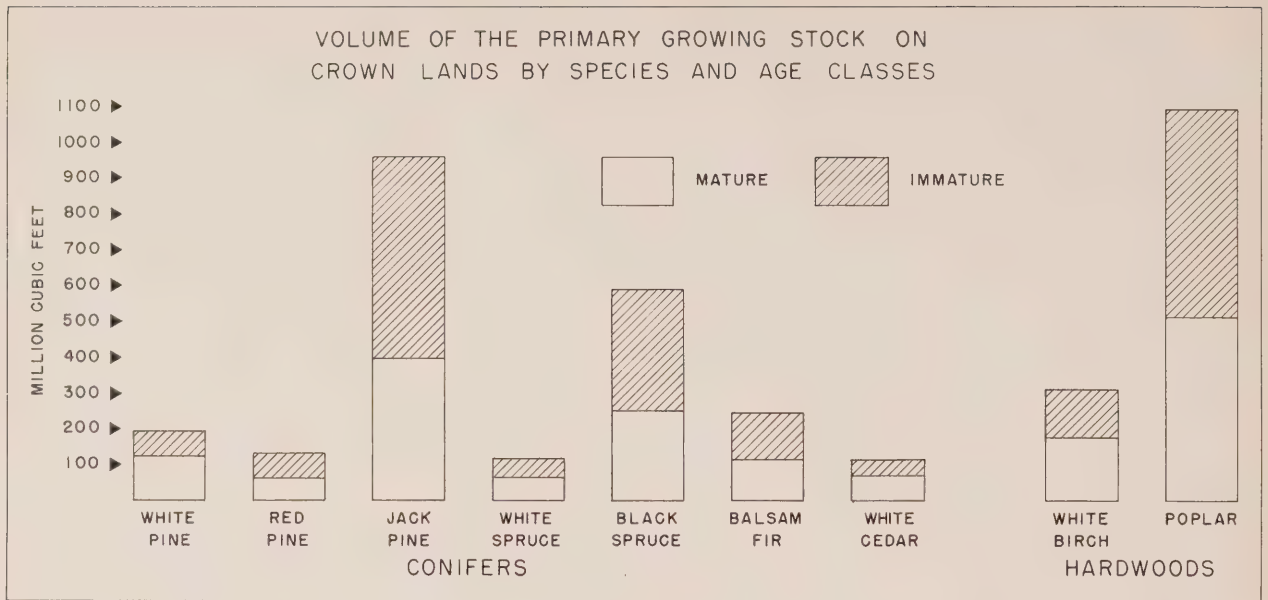


FIGURE 7

Jack pine and black spruce are the main conifers which, along with balsam fir and white and red pine, make up 90 per cent of the coniferous volume on Crown lands (fig. 7). White spruce, white cedar and larch occur in smaller quantities. White birch and poplar comprise 98 per cent of the hardwood volume, while the remaining 2 per cent is made up of miscellaneous hardwoods.

On patented lands the volume of conifers is 113 million cubic feet or 43 per cent of the total volume on patented lands, while the volume of hardwoods is 150 million cubic feet or 57 per cent of the total volume (table 10). In the mature age class on patented lands, 38 per cent of the volume is conifers and 62 per cent is hardwoods. In the immature age class 48 per cent of the volume is conifers and 52 per cent hardwoods.



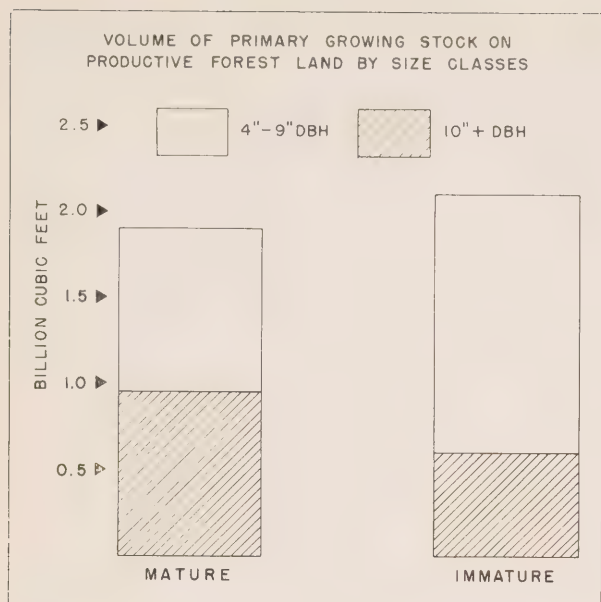


FIGURE 8

#### *Sawlogs vs. Pulpwood*

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material from 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in trees 4-9 inches d.b.h. are considered as pulpwood and cordwood material, depending on the species; although poles, railway ties, and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for sawlogs, and other uses where large timber is required. A tree 10 inches d.b.h. outside bark will on the average give one log, sixteen feet long, 8 inches in diameter inside bark at the small end. In addition, there is residual smaller size material in the top which may be used as pulpwood or for purposes other than saw timber. The quantity in this residual top is relatively small and is included in the 10 inches and over material in all inventory estimates.

Of the volume of the primary growing stock on productive forest lands, 2,526 million cubic feet are in the 4-9 inch d.b.h. class, and 1,516 million cubic feet in the 10 inch d.b.h. class and over (table 8). Sixty-two per cent of the total volume is in the pulpwood size class, and 38 per cent is of sawlog size. The mature age class is almost equally divided between the two size classes, with 966 million cubic feet in the 4-9 inch size class and 952 million cubic feet 10 inches d.b.h. and over (fig. 8).

On Crown lands 2,372 million cubic feet or 63

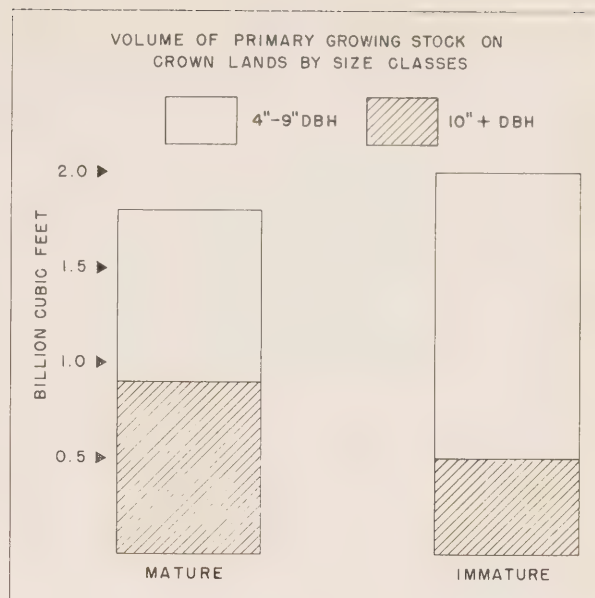
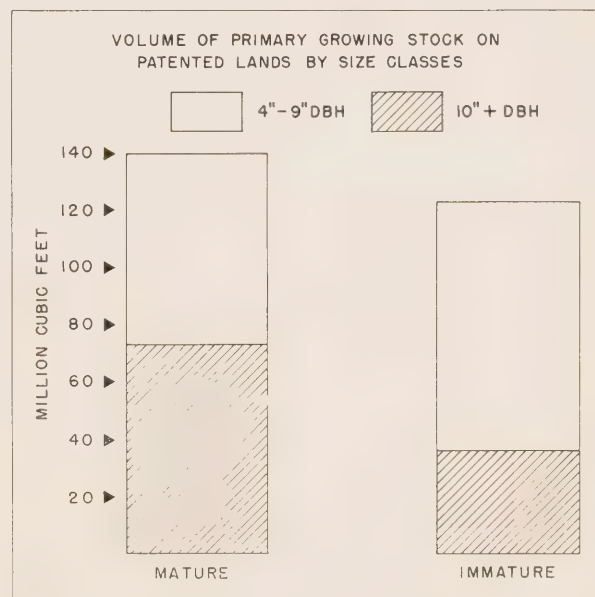


FIGURE 9

per cent is in the 4-9 inch class and 1,406 million cubic feet or 37 per cent is in the 10 inch and over class (table 9). The mature age class on Crown lands has 899 million cubic feet or 51 per cent of the volume in the pulpwood class, and 879 million cubic feet or 49 per cent of sawlog size (fig. 9).

Patented lands within the district contain 263 million cubic feet (table 10). The 4-9 inch d.b.h. class contains 58 per cent and the 10 inch and over

FIGURE 10



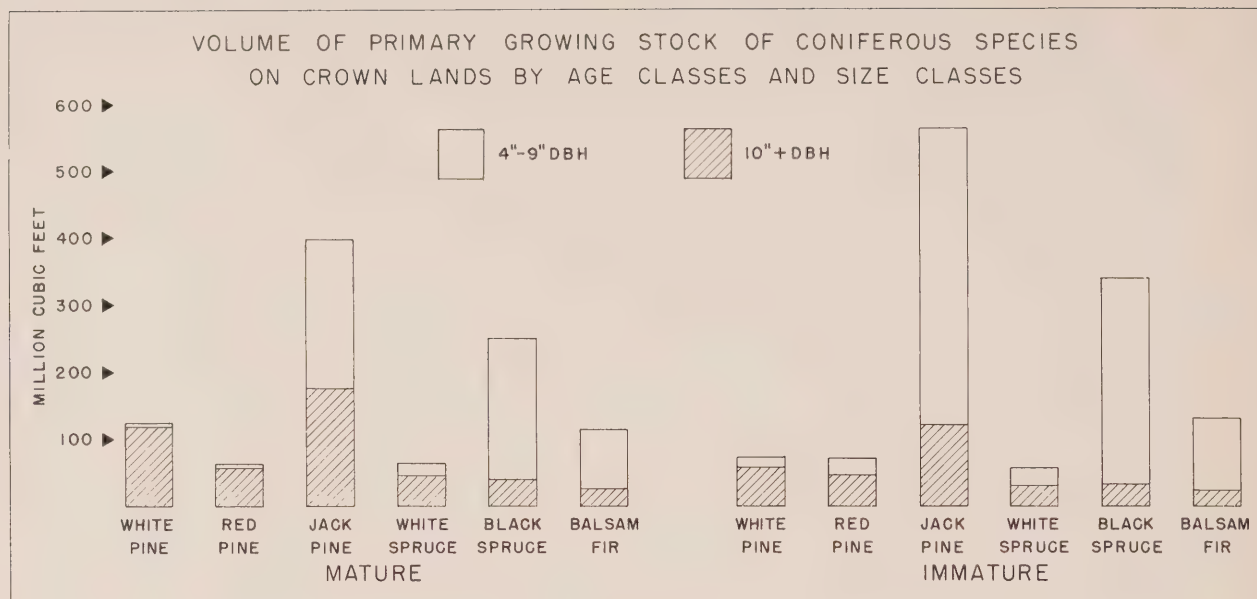


FIGURE 11

class 42 per cent of the volume on patented lands. The sawlog size class comprises 52 per cent of the mature volume on patented lands (fig. 10).

The sawlog size class in the mature forest on Crown land contains 495 million cubic feet of conifers and 384 million cubic feet of hardwoods (table 9). Conifers have 46 per cent of the mature volume in the sawlog size class, while hardwoods have 55 per cent in this class. The principal conifer in the sawlog size class is jack pine, which comprises 36 per cent of the mature softwood sawlog volume (fig. 11). It is closely followed by white and red pine which make up 35 per cent of the mature coniferous sawlog volume. The remaining 29 per cent of the coniferous volume in this age and size class is made up as follows: white spruce 9 per cent, black spruce 8 per cent, white cedar 7 per cent and balsam fir 5 per cent. The two leading coniferous species in the district are jack pine and black spruce. In the mature age class the 4-9 inch d.b.h. group contains 56 per cent of the jack pine volume and 84 per cent of the black spruce; while in the immature age class these percentages become 79 for jack pine and 91 for black spruce.

Two species, white birch and poplar are the principal hardwoods of the district. Hardwoods on Crown lands comprise 1,422 million cubic feet, or 38 per cent of the total volume on Crown lands. Poplar is the principal species in both age classes comprising 81 per cent of the mature hardwood sawlog volume (fig. 12). White birch accounts for

18 per cent of the mature hardwood sawlog volume, while the remaining one per cent is made up of minor hardwood species.

Patented lands, covering 9 per cent of the forested area, have 58 per cent of the volume in the 4-9 inch

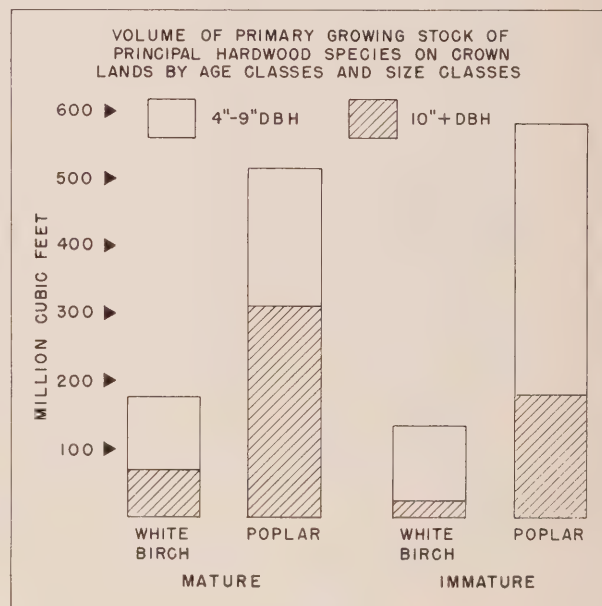


FIGURE 12

class. The size class distribution of the principal species for the mature and immature forest on patented lands is shown in figure 13.



VOLUME OF THE PRIMARY GROWING STOCK OF PRINCIPAL SPECIES  
ON PATENTED LANDS BY AGE CLASSES AND SIZE CLASSES

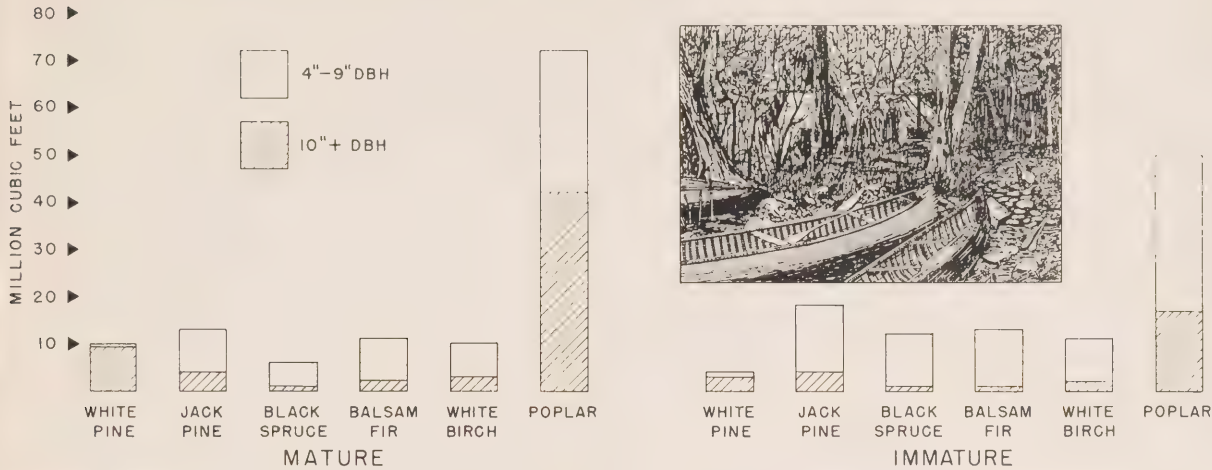


FIGURE 13



TABLE 5. — *Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Fort Frances district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	446,762	332,039	797,922	268,928	1,845,651
Hardwood.....	106,804	118,742	193,428	40,407	459,381
Mixedwoods....	412,589	501,616	568,457	254,066	1,736,728
TOTAL.....	966,155	952,397	1,559,807	563,401	4,041,760

ALL CONIFERS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	391,098	275,630	692,669	200,341	1,559,738
Hardwood.....	8,448	8,540	16,966	10,055	44,009
Mixedwoods....	212,136	236,970	288,451	128,689	866,246
TOTAL.....	611,682	521,140	998,186	339,085	2,469,993

ALL HARDWOODS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	55,664	56,409	105,253	68,587	285,913
Hardwood.....	98,356	110,202	176,462	30,352	415,372
Mixedwoods....	200,453	264,646	280,006	125,377	870,482
TOTAL.....	354,473	431,257	561,721	224,316	1,571,767

TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown land in the Fort Frances district by species groups, age class, and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	435,902	323,411	771,292	259,065	1,789,670
Hardwood.....	84,114	95,948	170,365	35,631	386,058
Mixedwoods....	379,069	459,540	531,383	232,617	1,602,609
TOTAL.....	899,085	878,899	1,473,040	527,313	3,778,337

ALL CONIFERS

Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	381,423	268,489	669,272	193,050	1,512,234
Hardwood.....	7,287	8,063	16,011	9,721	41,082
Mixedwoods....	195,250	218,370	269,991	119,620	803,231
TOTAL.....	583,960	494,922	955,274	322,391	2,356,547

ALL HARDWOODS

Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	54,479	54,922	102,020	66,015	277,436
Hardwood.....	76,827	87,885	154,354	25,910	344,976
Mixedwoods....	183,819	241,170	261,392	112,997	799,378
TOTAL.....	315,125	383,977	517,766	204,922	1,421,790

TABLE 7. — *Cubic-foot volumes of primary growing stock on patented land in the Fort Frances district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	10,860	8,628	26,630	9,863	55,981
Hardwood.....	22,690	22,794	23,063	4,776	73,323
Mixedwoods.....	33,520	42,076	37,074	21,449	134,119
TOTAL.....	67,070	73,498	86,767	36,088	263,423

ALL CONIFERS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	9,675	7,141	23,397	7,291	47,504
Hardwood.....	1,161	477	955	334	2,927
Mixedwoods.....	16,886	18,600	18,460	9,069	63,015
TOTAL.....	27,722	26,218	42,812	16,694	113,446

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
Coniferous.....	1,185	1,487	3,233	2,572	8,477
Hardwood.....	21,529	22,317	22,108	4,442	70,396
Mixedwoods.....	16,634	23,476	18,614	12,380	71,104
TOTAL.....	39,348	47,280	43,955	19,394	149,977

TABLE 8. — *Cubic-foot volumes of primary growing stock on productive forest land in the Fort Frances district by species and age classes in two size classes.*

Species	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	
White pine.....	5,718	127,308	16,307	60,496	209,829
Red pine.....	7,374	60,800	25,226	48,828	142,228
Jack pine.....	230,665	179,934	457,084	124,221	991,904
White spruce...	21,774	48,981	27,602	32,908	131,265
Black spruce...	215,366	39,942	317,549	33,380	606,237
Balsam fir.....	96,829	27,089	126,883	17,369	268,110
White cedar.....	33,043	36,882	26,239	21,874	118,038
Larch.....	913	204	1,196	69	2,382
TOTAL CONIFERS	611,682	521,140	998,086	339,085	2,469,993
White elm.....	701	3,499			4,200
Red oak.....	234	434			668
White birch.....	113,423	72,239	119,663	25,312	330,637
Poplar (all).....	233,401	352,126	432,580	197,515	1,215,622
Red maple.....	2,259	464	2,471	268	5,462
Ash.....	4,455	2,495	7,007	1,221	15,178
TOTAL HARDWOODS	354,473	431,257	561,721	224,316	1,571,767
TOTAL ALL SPECIES.....	966,155	952,397	1,559,807	563,401	4,041,760





TABLE 9.—Cubic-foot volumes of primary growing stock on Crown land in the Fort Frances district by species and age class in two size classes.

Species	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine	5,399	117,785	15,340	57,077	195,601
Red pine...	6,970	56,964	23,896	46,175	134,005
Jack pine	221,639	175,528	442,659	120,146	959,972
White spruce...	18,808	44,693	25,710	30,622	119,833
Black spruce...	210,297	38,881	306,552	32,113	587,843
Balsam fir.....	88,122	24,984	115,103	15,661	243,870
White cedar	31,812	35,883	24,818	20,528	113,041
Larch.....	913	204	1,196	69	2,382
TOTAL CONIFERS	583,960	494,922	955,274	322,391	2,356,547
White elm...	372	1,855	.....	.....	2,227
Red oak.....	124	230	.....	.....	354
White birch...	106,840	69,319	111,046	23,234	310,439
Poplar (all)...	202,837	310,422	399,596	180,544	1,093,399
Red maple...	2,217	456	2,409	262	5,344
Ash.....	2,735	1,695	4,715	882	10,027
TOTAL HARDWOODS	315,125	383,977	517,766	204,922	1,421,790
TOTAL ALL SPECIES	899,085	878,899	1,473,040	527,313	3,778,337

TABLE 10.—Cubic-foot volumes of primary growing stock on patented lands in the Fort Frances district by species and age classes in two size classes.

Species	Mature		Immature		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	319	9,523	967	3,419	14,228
Red pine.....	404	3,836	1,330	2,653	8,223
Jack pine.....	9,026	4,406	14,425	4,075	31,932
White spruce...	2,966	4,288	1,892	2,286	11,432
Black spruce...	5,069	1,061	10,997	1,267	18,394
Balsam fir.....	8,707	2,105	11,780	1,648	24,240
White cedar.....	1,231	999	1,421	1,346	4,997
Larch.....	.....	.....	.....	.....	.....
TOTAL CONIFERS.....	27,722	26,218	42,812	16,694	113,446
White elm.....	329	1,644	.....	.....	1,973
Red oak.....	110	204	.....	.....	314
White birch.....	6,583	2,920	8,617	2,078	20,198
Poplar (all).....	30,564	41,704	32,984	16,971	122,223
Red maple.....	42	8	62	6	118
Ash.....	1,720	800	2,292	339	5,151
TOTAL HARDWOODS	39,348	47,280	43,955	19,394	149,977
TOTAL ALL SPECIES.....	67,070	73,498	86,767	36,088	263,423





### Allowable Cut

The calculations of the allowable cut have been carried out for each species by means of a volume formula<sup>1</sup> using an appropriate rotation<sup>2</sup>. The amount of the annual allowable cut results directly from the volume of the primary growing stock and rotation used for the different species encountered in the district. The present allowable cut figures like the volume of the primary growing stock may be on areas which, at the moment, are inaccessible to operations. The allowable cut volumes may likewise be in stands which, due to low net yield, are economically inoperable. Taking these conditions into account, the computed allowable cut is regarded as potential, rather than actually obtainable under present operating conditions.

Woods operations are being carried on each year and with present stands growing older, the size and structure of the primary growing stock will change. The calculation of the allowable cut based on the present volume of the primary growing stock, is of value for a period of about ten years. On expiration of the initial ten year period the allowable cut should be calculated anew, based on the experience of the first ten year period and in conformity with the actual performance of the forest. With effective forestry practices allowable cuts for the more valuable species will tend, almost certainly, to increase; without improved forestry practices the present trend to more poplar will continue.

Patented lands in the district comprise only 9 per cent of the forest area and are, for the most part, in small holdings. For that reason the allowable cut for patented lands has been calculated on a shorter rotation than for Crown lands of the district.

The annual allowable cut, or net depletion allow-

able under management in the Fort Frances district, is 109,597,010 cubic feet; 97,540,065 cubic feet from Crown lands and 12,056,945 cubic feet from patented lands. Of the total allowable cut, 89 per cent is on Crown lands and 11 per cent on patented lands.

### CROWN LANDS

The annual allowable cut for Crown lands represents 2.6 per cent of the primary growing stock or 35.1 cubic feet per acre on the productive forest area. Of the total allowable cut, approximately one half is coniferous species and one half hardwoods. Since the rotation is on the average longer for conifers than for hardwoods, the annual allow-

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Fort Frances district.*

Species	Annual allowable cut cu. ft.
White pine.....	3,056,260
Red pine.....	2,512,600
Jack pine.....	25,713,545
White spruce.....	2,246,870
Black spruce.....	9,185,050
Balsam fir.....	5,080,610
White cedar.....	1,059,760
Larch.....	44,670
<b>TOTAL CONIFERS.....</b>	<b>48,899,365</b>

able cut for conifers is 2.1 per cent of the coniferous primary growing stock and 3.4 per cent for the hardwoods.

The annual allowable cut for species making up the coniferous content (table 11) shows that 53 per cent is jack pine, 23 per cent white and black spruce,

TABLE 12. — *Annual allowable cut for hardwood species on Crown lands.*

Species	Annual allowable cut cu. ft.
White elm.....	27,830
Red oak.....	3,320
White birch.....	7,275,930
Poplar.....	41,002,480
Red maple.....	143,130
Ash, white and black.....	188,010
<b>TOTAL HARDWOODS.....</b>	<b>48,640,700</b>

11 per cent white and red pine, 11 per cent balsam fir and 2 per cent other conifers. The relationship of the allowable cut for a ten-year period to the volume of the coniferous primary growing stock by species is shown graphically, figure 14.

The species making up the hardwood content

<sup>1</sup> Method of calculation of allowable cut is given in Appendix, allowable cut, method, page 28.

<sup>2</sup> Rotation by species, table 16, page 28.



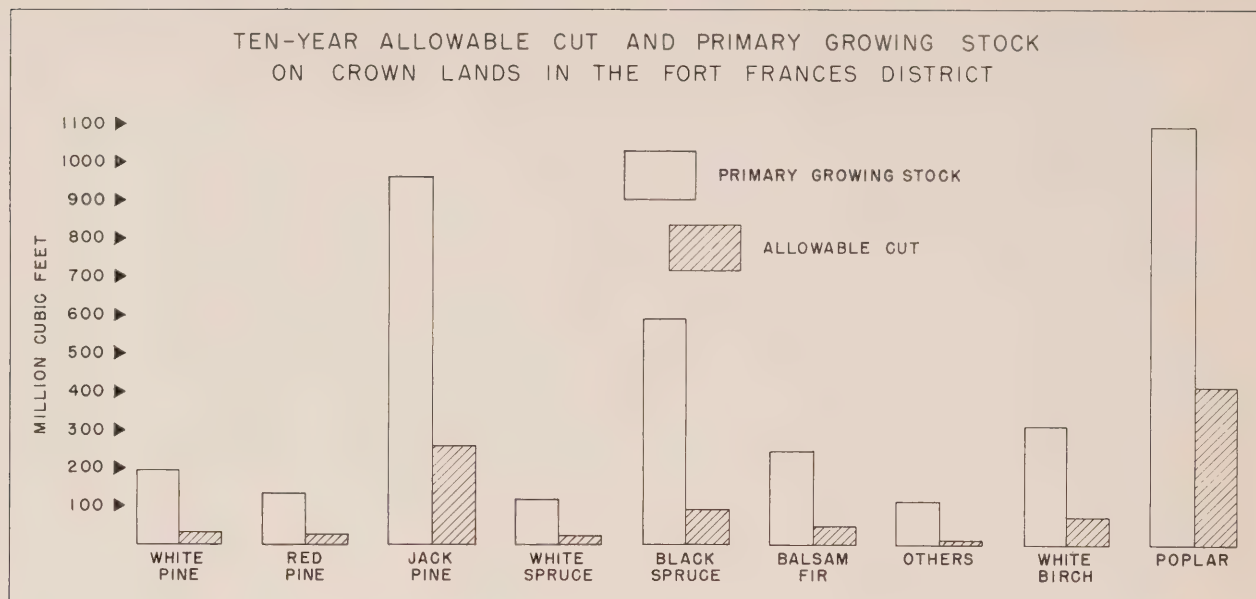


FIGURE 14

(table 12) show that 84 per cent is poplar, 15 per cent white birch and one per cent other hardwoods. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods is shown graphically, figure 14.

#### PATENTED LANDS

The annual allowable cut for patented lands amounts to 12,056,945 cubic feet, which represents 4.6 per cent of the primary growing stock, or 43.3 cubic feet per acre on the productive forest land. The annual allowable cut on patented lands is

TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut cu. ft.
White pine.....	296,430
Red pine.....	256,945
Jack pine .....	1,496,820
White spruce .....	357,235
Black spruce .....	383,210
Balsam fir.....	757,500
White cedar .....	93,695
<b>TOTAL CONIFERS.....</b>	<b>3,641,835</b>
White elm .....	37,000
Red oak .....	5,885
White birch .....	631,180
Poplar .....	7,638,895
Red maple.....	5,570
Ash, white and black.....	96,580
<b>TOTAL HARDWOODS .....</b>	<b>8,415,110</b>
<b>TOTAL.....</b>	<b>12,056,945</b>

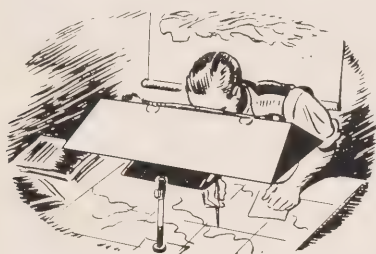
3.2 per cent of the coniferous primary growing stock and 5.6 per cent for hardwoods. The justification for cutting annually over five per cent of the primary growing stock of hardwoods is to be found in the very short rotation of thirty years on which the large areas of poplar stands are expected to be managed.

The annual allowable cut for coniferous species on patented lands is 3,641,835 cubic feet, and for hardwoods is 8,415,110 cubic feet. More than two





thirds of the total allowable cut is for the two intolerant hardwood species, poplar and white birch, which together contribute 8,270,075 cubic feet to the total allowable cut. For the coniferous species jack pine is most important, followed by balsam fir, white and black spruce and white and red pine (table 13).



### Utilization vs. Allowable Cut

According to the Classification of Annual Timber Returns for the period 1946-1949<sup>1</sup>, inclusive, wood and forest products were cut on Crown lands in the Fort Frances district as follows:

Logs and booms.....	10,585,225 F.B.M. Doyle rule
Construction timber.....	1,022 lineal feet
Poles.....	1,786 pieces
Posts.....	7,854 pieces
Car stakes.....	160 pieces
Pulpwood.....	72,925 cords
Fuelwood.....	954 cords

TABLE 14. — Gross total cubic volume of wood utilized annually in the Fort Frances district.

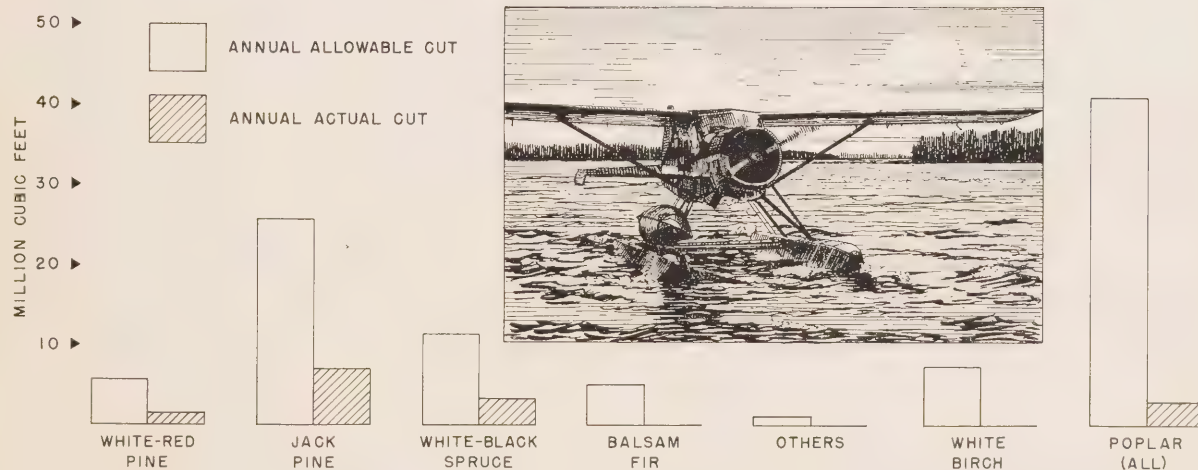
Species	Wood utilized cu. ft.	Total per cent
Pine, white and red.....	1,448,692	10
Jack pine.....	6,994,031	47
Spruce, white and black.....	3,342,275	23
Balsam fir.....	46,349	—
White cedar.....	24,527	—
<b>TOTAL CONIFERS.....</b>	<b>11,855,874</b>	<b>80</b>
White birch.....	4,546	—
Poplar.....	2,882,992	20
Others.....	326	—
<b>TOTAL HARDWOODS.....</b>	<b>2,887,864</b>	<b>20</b>
<b>TOTAL.....</b>	<b>14,743,738</b>	<b>100</b>

TABLE 15. — Comparison of allowable cut with actual utilization by species.

Species	Allowable cut Thousand cu. ft.	Actual cut Thousand cu. ft.
Pine, white and red.....	5,569	1,449
Jack pine.....	25,713	6,994
Spruce, white and black.....	11,432	3,342
Balsam fir.....	5,080	46
White cedar.....	1,060	25
Others.....	45	—
<b>TOTAL CONIFERS.....</b>	<b>48,899</b>	<b>11,856</b>
White birch.....	7,276	5
Poplar.....	41,002	2,883
Others.....	363	—
<b>TOTAL HARDWOODS.....</b>	<b>48,641</b>	<b>2,888</b>
<b>TOTAL.....</b>	<b>97,540</b>	<b>14,744</b>

FIGURE 15

### ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LANDS



<sup>1</sup> Reports of the Minister of Lands and Forests, for the Province of Ontario, for the fiscal year ending March 31, 1947-1950.

With the use of appropriate converting factors, these amounts are expressed in gross total cubic feet, and are comparable with the figures for allowable cut (table 14).

A comparison of the annual allowable cut with the actual cut by species (table 15) indicates that utilization of all species was less than the allowable cut (fig. 15). The cut of white and black spruce was 29 per cent of the allowable cut volumes; only 26 per cent of the allowable cut for white and red pine was actually utilized and 27 per cent for jack pine. Other conifers including white cedar and balsam fir contributed negligible volumes to the

coniferous volume actually cut. In all, the cut of conifers was 24 per cent of the coniferous allowable cut, and only 6 per cent of the allowable cut for hardwood species was utilized. Only 7 per cent of the allowable cut for poplar was utilized and an inappreciable volume of white birch; thus excessive volumes of both hardwood species remain unutilized on Crown lands in the Fort Frances district.

There are no available records on the quantity of timber utilized from patented lands in the Fort Frances district, and consequently no comparison of the allowable with the annual actual cut is made.





# APPENDIX



## *Survey Methods*

The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level with a six-inch focal length camera to produce photographs on a scale of four inches to the mile (1/15,840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs, and transferred to base maps.

Field sampling was carried out during the summers of 1950 and 1951 by crews who collected all the data necessary for the making of volume estimates. On the completion of the field work, finished forest type maps were prepared, and areas determined by the usual methods<sup>1</sup>.

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. The district lies entirely within one ecological section, and these summaries were made separately for each year's cruise. The per acre volumes in cubic feet, made up in this manner, are shown in tables 18 and 19.

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the Fort Frances district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Fort Frances district are shown in figure 16.

## *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 28 cubic feet per acre, and for patented land, 43 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

## *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range from 10 to 150 years, the mature age class from 30 to 200 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

<sup>1</sup> A complete statement of the methods used in the forest resources inventory is contained in the Manual of Timber Management, Department of Lands and Forests, Ontario—Part II and Part III.



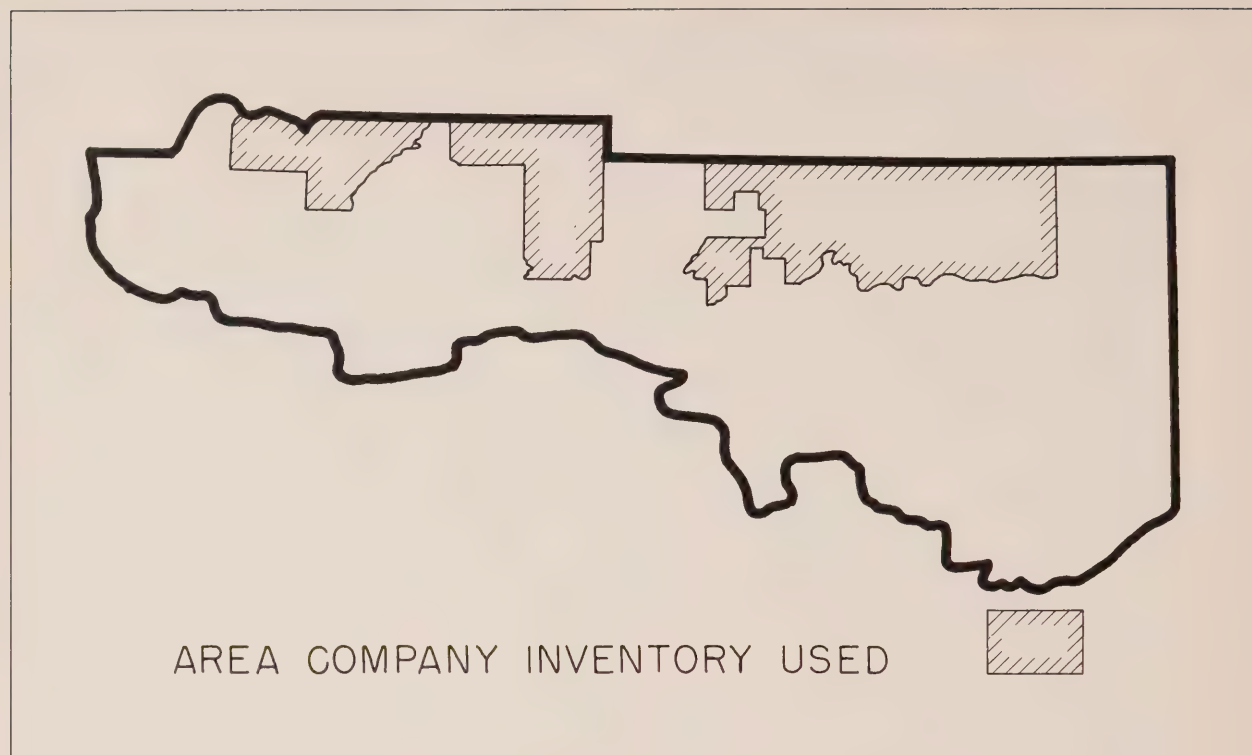


FIGURE 16

### Rotation

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class 1b<sup>1</sup> were used as rotation ages for each species encountered except jack pine where a rotation of 70 years has been accepted as more suitable than that of 60 years (table 16).

### Allowable Cut

#### (a) METHOD

The following two bases were available for calculation of allowable cut: 1. the volumes of the mature and immature age classes for each species, and 2. the adopted rotation for species.

The compilation was carried out in such a way that the volumes were shown by species, separately, and the method of calculation most suitable to the available data is by a volumetric formula.

In view of this, the "French Method of 1883"<sup>2</sup> was considered and found to be satisfactory for the following reasons: 1. The ratio of the volume per acre of mature to immature age class actually has

TABLE 16. — Rotation by species.

Species	Crown land years	Patented land years
White pine.....	120	90
Red pine.....	100	60
Jack pine.....	70	40
White spruce.....	100	60
Black spruce.....	120	90
Balsam fir.....	90	60
White cedar.....	200	100
Larch.....	100	75
White elm.....	150	100
Red oak.....	200	100
White birch.....	80	60
Poplar.....	50	30
Red maple.....	70	40
White and black ash.....	100	100

been found, so far in Ontario, to be approximately 5/3 required by the French method. 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. 3. The French method is recognized as sound enough though not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

<sup>1</sup> Manual of Timber Management, Department of Lands and Forests, Ontario — Part II, page 50.

<sup>2</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.

## (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I)  
V.2. — denotes volume of immature timber (Age Class II)  
n — rotation  
P — annual allowable cut

With the aid of the formula, allowable cut has been calculated for each species, separately, with full consideration of the actual growing stock of each species and the proper rotation. Thus all uncertain assumptions, such as an average rotation for all species, or on species content of the allowable cut calculated in one figure only for the whole district, have been eliminated.

The results of individual calculations for each species have been totalled and shown as allowable cut for Crown and patented lands.

## Cull Factor

Where it was necessary in the course of the inventory to determine the volume of the primary growing stock where company reports gave only merchantable volumes, or for the calculation of merchantable volumes from primary growing stock, cull factors (table 17) were used. These cull factors were made available from operations in the district.

TABLE 17. — Cull factors by species, Fort Frances district.

Species	Cull per cent
White pine.....	15
Red pine.....	15
Jack pine.....	16
White spruce.....	5
Black spruce.....	5
Balsam fir.....	20
White cedar.....	33
White birch.....	22
Poplar.....	40
White and black ash.....	10

## Common and Botanical Names of Tree Species included in Timber Estimates

### CONIFERS

White pine.....	<i>Pinus strobus</i> L.
Red pine.....	<i>Pinus resinosa</i> Ait.
Jack pine.....	<i>Pinus banksiana</i> Lamb.
White spruce.....	<i>Picea glauca</i> (Moench) Voss.
Black spruce.....	<i>Picea mariana</i> (Mill.) BSP.
Balsam fir.....	<i>Abies balsamea</i> (L.) Mill.
White cedar.....	<i>Thuja occidentalis</i> L.
Larch.....	<i>Larix laricina</i> (Du Roi) Koch.

### HARDWOODS

White elm.....	<i>Ulmus americana</i> L.
Red oak.....	<i>Quercus borealis</i> Michx. f.
Red maple.....	<i>Acer rubrum</i> L.
White ash.....	<i>Fraxinus americana</i> L.
Black ash.....	<i>Fraxinus nigra</i> Marsh.
White birch.....	<i>Betula papyrifera</i> Marsh.
Poplar.....	<i>Populus tremuloides</i> Michx.
	<i>Populus tacamahacca</i> Mill.
	<i>Populus grandidentata</i> Michx.



TABLE 18. — *Volume of the primary growing stock in cubic feet per acre*  
*Quetico Section — 1950*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
White pine .....	4"-9" 10" up	8.9 225.4	8.7 220.6	7.5 189.1	12.4 269.7	22.5 64.5	21.8 62.4	19.0 54.5	2.5 167.3
Red pine .....	4"-9" 10" up	23.7 177.5	23.2 173.7	19.9 148.9	1.9 35.0	41.8 69.5	40.5 67.2	35.3 58.6	3.8 11.4
Jack pine .....	4"-9" 10" up	544.3 265.6	532.6 259.9	456.7 222.9	116.0 76.7	552.3 135.5	534.6 131.1	466.3 114.4	24.1 24.4
White spruce .....	4"-9" 10" up	16.9 44.2	16.5 43.3	14.2 37.1	7.2 26.9	22.8 29.8	22.0 28.9	19.2 25.2	11.8 48.8
Black spruce .....	4"-9" 10" up	496.4 94.5	485.6 92.5	416.5 79.3	59.9 13.9	526.1 56.5	509.2 54.7	444.2 47.7	26.8 23.2
Balsam fir .....	4"-9" 10" up	116.8 33.5	114.2 32.8	98.0 28.1	67.5 39.5	111.7 13.7	108.2 13.2	94.4 11.5	81.1 .....
White cedar .....	4"-9" 10" up	63.3 87.0	61.9 85.1	53.1 73.0	13.4 49.3	32.3 26.4	31.2 25.6	27.2 22.3	30.3 79.6
TOTAL CONIFERS .....	4"-9" 10" up	1270.3 927.7	1242.7 907.9	1065.9 778.4	278.3 511.0	1309.5 395.9	1267.5 383.1	1105.6 334.2	180.4 354.7
White birch .....	4"-9" 10" up	64.2 63.2	62.8 61.8	53.8 53.0	16.7 39.5	50.0 20.8	48.4 20.1	42.2 17.6	33.3 23.6
Poplar (all) .....	4"-9" 10" up	90.9 130.7	88.9 127.9	76.2 109.7	34.5 41.1	130.6 116.2	126.4 112.5	110.2 98.2	0.3 165.7
Red maple .....	4"-9" 10" up	.....	.....	.....	0.9	.....	.....	.....	.....
TOTAL HARDWOODS .....	4"-9" 10" up	155.1 193.9	151.7 189.7	130.0 162.7	52.1 80.6	180.6 137.0	174.8 132.6	152.4 115.8	33.6 189.3
GRAND TOTAL .....	4"-9" 10" up	1425.4 1121.6	1394.4 1097.6	1195.9 941.1	330.4 591.6	1490.1 532.9	1442.3 515.7	1258.0 450.0	214.0 544.0
TOTAL 4" UP .....		2547.0	2492.0	2137.0	922.0	2023.0	1958.0	1708.0	758.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
White pine .....	4"-9" 10" up	9.0 24.0	8.5 22.6	6.9 18.3	..... 284.1	1.2 29.1	1.1 26.6	0.8 19.4	.....
Jack pine .....	4"-9" 10" up	15.8 44.6	14.9 42.0	12.1 34.2	1.1 3.3	86.1 42.4	78.9 38.8	57.6 28.4	29.0 19.0
White spruce .....	4"-9" 10" up	13.1 28.1	12.4 26.4	10.0 21.5	10.6 35.5	5.7 15.1	5.2 13.8	3.8 10.1	2.2 4.9
Black spruce .....	4"-9" 10" up	18.9 3.1	17.7 3.0	14.4 2.4	1.1 .....	17.0 3.8	15.6 3.4	11.4 2.5	1.0 .....
Balsam fir .....	4"-9" 10" up	35.0 22.7	32.9 21.4	26.8 17.4	5.8 13.9	37.0 14.0	33.9 12.8	24.8 9.4	4.6 .....
White cedar .....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	7.1
TOTAL CONIFERS .....	4"-9" 10" up	91.8 122.5	86.4 115.4	70.2 93.8	18.6 336.8	147.0 104.4	134.7 95.4	98.4 69.8	36.8 31.0
White birch .....	4"-9" 10" up	390.9 166.7	368.2 157.0	299.1 127.6	44.5 117.9	236.0 13.5	216.1 12.3	158.0 9.0	22.4 .....
Poplar (all) .....	4"-9" 10" up	766.2 1154.0	721.5 1086.8	586.3 883.0	153.5 425.7	1232.5 141.5	1128.2 129.5	824.9 94.7	382.9 33.8
Soft maple .....	4"-9" 10" up	10.4 3.3	9.8 3.1	7.9 2.6	.....	1.9	1.7	1.3	.....
Ash .....	4"-9" 10" up	19.7 21.5	18.5 20.3	15.1 16.4	.....	7.4 5.8	6.8 5.3	5.0 3.9	3.1 .....
TOTAL HARDWOODS .....	4"-9" 10" up	1187.2 1345.5	1118.0 1267.2	908.4 1029.6	198.0 543.6	1477.8 160.8	1352.8 147.1	989.2 107.6	408.4 33.8
GRAND TOTAL .....	4"-9" 10" up	1279.0 1468.0	1204.4 1382.6	978.6 1123.4	216.6 880.4	1624.8 265.2	1487.5 242.5	1087.6 177.4	445.2 64.8
TOTAL 4" UP .....		2747.0	2587.0	2102.0	1097.0	1890.0	1730.0	1265.0	510.0



TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	15.8	14.9	12.0	.....	21.9	20.5	16.2	4.1
	10" up	206.4	194.4	157.6	267.9	69.5	65.1	51.4	29.5
Red pine.....	4"-9"	9.6	9.1	7.3	.....	22.5	21.0	16.6	11.7
	10" up	64.5	60.7	49.2	.....	42.5	39.8	31.4	43.0
Jack pine.....	4"-9"	184.0	173.4	140.4	6.3	305.7	286.1	225.9	124.7
	10" up	249.0	234.6	190.0	60.1	143.2	134.0	105.8	47.8
White spruce.....	4"-9"	39.2	37.0	29.9	11.2	30.8	28.9	22.8	5.3
	10" up	106.1	99.9	81.0	56.3	42.3	39.5	31.2	12.7
Black spruce.....	4"-9"	164.1	154.6	125.2	70.2	212.5	198.9	157.0	27.9
	10" up	52.4	49.4	40.0	34.4	23.1	21.6	17.1	8.8
Balsam fir.....	4"-9"	188.7	177.8	144.1	67.9	121.7	114.0	90.0	42.3
	10" up	44.9	42.3	34.2	21.4	18.4	17.2	13.6	11.2
White cedar.....	4"-9"	32.9	30.9	25.0	9.0	19.2	18.0	14.2	.....
	10" up	29.8	28.1	22.8	8.4	15.3	14.3	11.3	.....
TOTAL CONIFERS.....	4"-9"	634.3	597.7	483.9	164.6	734.3	687.4	542.7	216.6
	10" up	753.1	709.4	574.8	448.5	354.3	331.5	261.8	153.0
White birch.....	4"-9"	232.1	218.7	177.1	83.1	174.9	163.7	129.3	29.5
	10" up	183.9	173.2	140.3	178.3	36.3	34.0	26.8	6.6
Poplar (all).....	4"-9"	359.9	339.1	274.6	51.7	454.4	425.3	335.8	128.8
	10" up	674.3	635.2	514.6	155.2	264.6	247.7	195.6	58.7
Red maple.....	4"-9"	9.7	9.1	7.4	6.1	10.9	10.2	8.0	2.4
	10" up	1.7	1.6	1.3	1.5	1.3	1.2	1.0	.....
Ash.....	4"-9"	.....	.....	.....	.....	.....	.....	.....	3.8
	10" up	.....	.....	.....	.....	.....	.....	.....	1.6
TOTAL HARDWOODS.....	4"-9"	601.7	566.9	459.1	140.9	640.2	599.2	473.1	164.5
	10" up	859.9	810.0	656.2	335.0	302.2	282.9	223.4	66.9
GRAND TOTAL.....	4"-9"	1236.0	1164.6	943.0	305.5	1374.5	1286.6	1015.8	381.1
	10" up	1613.0	1519.4	1231.0	783.5	656.5	614.4	485.2	219.9
TOTAL 4" UP.....		2849.0	2684.0	2174.0	1089.0	2031.0	1901.0	1501.0	601.0

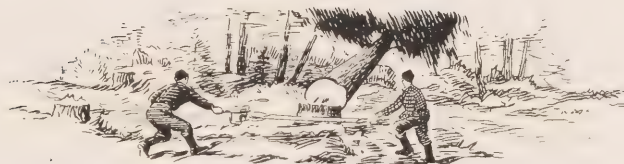


TABLE 19 — *Volume of the primary growing stock in cubic feet per acre*  
*Quetico Section — 1951*

SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White spruce.....	4"-9"	10.2	9.7	7.5	3.1	.....	.....	.....	.....
	10" up	13.2	12.6	9.7	3.9	.....	.....	.....	.....
Balsam fir.....	4"-9"	43.7	41.6	32.0	13.1	36.0	32.0	24.4	11.1
	10" up	7.8	7.4	5.7	2.3	3.8	3.4	2.6	1.2
White cedar.....	4"-9"	5.6	5.3	4.1	1.7	.....	.....	.....	.....
	10" up	1.4	1.4	1.0	0.4	.....	.....	.....	.....
TOTAL CONIFERS.....	4"-9"	59.5	56.6	43.6	17.9	36.0	32.0	24.4	11.1
	10" up	22.4	21.4	16.4	6.6	3.8	3.4	2.6	1.2
White elm.....	4"-9"	17.2	16.4	12.6	5.1	.....	.....	.....	.....
	10" up	85.8	81.6	62.9	25.7	.....	.....	.....	.....
Red oak.....	4"-9"	5.7	5.5	4.2	1.7	.....	.....	.....	.....
	10" up	10.7	10.1	7.8	3.2	.....	.....	.....	.....
White birch.....	4"-9"	81.8	77.9	60.0	24.5	121.8	108.4	82.7	37.8
	10" up	30.5	29.1	22.4	9.1	6.1	5.5	4.2	1.9
Poplar (all).....	4"-9"	939.8	894.8	689.2	281.1	935.7	833.7	636.1	290.4
	10" up	986.0	938.8	723.1	295.0	228.1	203.2	155.1	70.8
Ash.....	4"-9"	65.5	62.4	48.0	19.6	73.9	65.9	50.3	23.0
	10" up	35.1	33.4	25.8	10.5	15.6	13.9	10.6	4.8
TOTAL HARDWOODS.....	4"-9"	1110.0	1057.0	814.0	332.0	1131.4	1008.0	769.1	351.2
	10" up	1148.1	1093.0	842.0	343.5	249.8	222.6	169.9	77.5
GRAND TOTAL.....	4"-9"	1169.5	1113.6	857.6	349.9	1167.4	1040.0	793.5	362.3
	10" up	1170.5	1114.4	858.4	350.1	253.6	226.0	172.5	78.7
TOTAL 4" UP.....		2340.0	2228.0	1716.0	700.0	1421.0	1266.0	966.0	441.0
		MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9"	6.8	6.7	6.0	2.8	19.3	18.6	15.0	6.1
	10" up	234.5	231.5	208.2	98.8	72.7	69.9	56.6	23.1
Red pine.....	4"-9"	6.7	6.6	5.9	2.8	19.4	18.7	15.1	6.2
	10" up	79.0	78.0	70.2	33.3	48.1	46.2	37.4	15.2
Jack pine.....	4"-9"	148.0	146.1	131.4	62.4	113.3	108.9	88.1	36.0
	10" up	50.4	49.8	44.8	21.2	31.9	30.7	24.8	10.2
White spruce.....	4"-9"	86.9	85.8	77.2	36.6	56.1	53.9	43.7	17.8
	10" up	113.8	112.3	101.0	48.0	62.5	60.1	48.6	19.9
Black spruce.....	4"-9"	22.8	22.5	20.2	9.6	22.0	21.2	17.1	6.9
	10" up	4.3	4.2	3.8	1.8	4.6	4.4	3.6	1.5
Balsam fir.....	4"-9"	217.8	215.0	193.4	91.8	361.5	347.5	281.2	114.9
	10" up	52.8	52.1	46.8	22.2	51.6	49.6	40.2	16.4
White cedar.....	4"-9"	18.2	17.9	16.1	7.6	31.7	30.4	24.6	10.1
	10" up	6.6	6.6	5.9	2.8	31.7	30.4	24.7	10.1
TOTAL CONIFERS.....	4"-9"	507.2	500.6	450.2	213.6	623.3	599.2	484.8	198.0
	10" up	541.4	534.5	480.7	228.1	303.1	291.3	235.9	96.4
White birch.....	4"-9"	123.9	122.3	110.1	52.2	184.2	177.1	143.3	58.6
	10" up	33.9	33.5	30.1	14.3	59.1	56.9	46.0	18.8
Poplar (all).....	4"-9"	363.0	358.3	322.3	152.9	423.8	407.5	329.8	134.7
	10" up	665.3	656.8	590.6	280.3	402.4	386.8	313.0	127.9
Ash.....	4"-9"	16.1	15.9	14.3	6.8	46.0	44.2	35.8	14.6
	10" up	4.2	4.1	3.7	1.8	3.1	3.0	2.4	1.0
TOTAL HARDWOODS.....	4"-9"	503.0	496.5	446.7	211.9	654.0	628.8	508.9	207.9
	10" up	703.4	694.4	624.4	296.4	644.6	646.7	361.4	147.7
GRAND TOTAL.....	4"-9"	1010.2	997.1	896.9	425.5	1277.3	1228.0	993.7	405.9
	10" up	1244.8	1228.9	1105.1	524.5	767.7	738.0	597.3	244.1
TOTAL 4" UP.....		2255.0	2226.0	2002.0	950.0	2045.0	1966.0	1591.0	650.0







**Hon. Welland S. Gemmell**  
*Minister*

**F. A. MacDougall**  
*Deputy Minister*

Report No. 15 of the  
**KENORA DISTRICT**

CAZON  
LF  
-F56



# *Forest Resources Inventory*

— 1953 —

Division of Timber Management  
Ontario Department of Lands and Forests

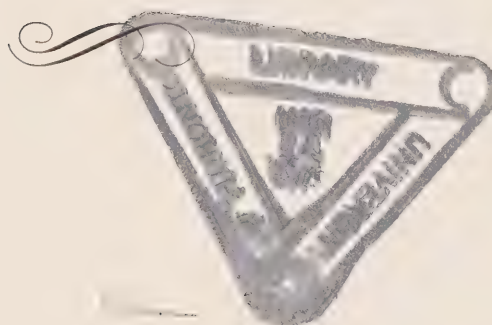




# *Forest Resources Inventory*

— 1953 —

Report No. 15 of the  
KENORA DISTRICT



Division of Timber Management  
Ontario Department of Lands and Forests

# PREFACE

● Within the past decade forestry in Ontario has been undergoing a transition from the old economy into a new, more stable one. The old economy was one of forest liquidation. History teaches us that as population increased, the necessity for cleared land grew. In the pioneering stage of development the abundance of trees made wood excessively cheap, and encouraged extravagance. Throughout most of the nation's history wood-dependent industries have drawn on virgin forests, a stockpile of raw material prepared and waiting for them. That economy now is coming to a close.

The administration of timber lands is passing into a new phase — the economy of tree growing — a phase in which dollar costs are incurred in timber production. Emergence into the new forest economy has been accompanied by unprecedented progress in the protection of forests from destructive agencies; the opportunity for utilizing inferior species and materials; an increase in wood prices through reduction of natural supplies on which no cost of production need be charged; the development of a desire for permanent investment instead of speculative ones; and an extension of government functions leading to the practice of forestry by the state on a large scale. When forestry is to be practised as an independent industry it becomes desirable, as in any large business undertaking, to plan, organize and manage the business so as to secure, continuously and systematically, a regular, nearly equal annual yield.

The forest exploiter also plans and organizes his business for annual returns, not, however, to be derived continuously from the same ground; he seeks a new field of exploitation, changing the location as soon as the accumulated stores of wood in the virgin forests have been exhausted. The forest property is then abandoned and devoted to purposes other than wood production, or if unsuitable for other than forest production, may remain barren over long periods.

The business of forestry is based upon the conception of what is technically called the “sustained yield,” a continued systematic use of the same property for wood-crops, the best and largest possible. This is secured by proper attention to silviculture, replacement of the harvested crop, and protecting and tending it until ready for harvesting again. Finally, when the industry is fully established, this sustained yield is annually derived as far as practicable in equal or nearly equal amounts forever, under an “annual sustained yield management.”

In order to secure the data upon which sustained yield management may be brought about, a forest survey is necessary. In 1946 Ontario set in motion plans for carrying out a forest resources inventory covering the exploitable forest area of the Province. Commencing April 1, 1951, the Federal Department of Resources and Development has reimbursed to the Province one half of the expenditures incurred in forest resources inventory, under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

For purposes of administration of the renewable natural resources, the Department of Lands and Forests has set up twenty-two districts, each administered by a District Forester and staff, from an office located centrally in the district. The forest resources inventory covers sixteen complete and parts of two of these forest administrative districts, totalling 172,000 square miles, and comprising the accessible forest area of Ontario. This report, the fifteenth in the series, deals with the results of the inventory in the Kenora district.

While the report deals primarily with the physical resources, the underlying purpose has been to measure the capacity of the forest to contribute to employment and community welfare, and to the industrial and commercial development of the Province as a whole. This objective may be attained most effectively through the use of the comprehensive forest resources data in the preparation of long term timber management plans.

# CONTENTS

	PAGE		PAGE
SURVEY HIGHLIGHTS.....	5	ALLOWABLE CUT.....	21
FOREST INVENTORY.....	9	UTILIZATION VS. ALLOWABLE CUT.....	23
AREAS.....	9	APPENDIX.....	26
FOREST LAND OWNERSHIP.....	10	SURVEY METHODS.....	26
AGE CLASSES.....	11	MEAN ANNUAL INCREMENT.....	27
REGIONAL FOREST TYPES.....	12	AGE CLASSES.....	27
COVER TYPES.....	14	ROTATION.....	27
VOLUME.....	15	ALLOWABLE CUT.....	27
CONIFERS VS. HARDWOODS.....	18	CULL FACTOR.....	28
SAWLOGS VS. PULPWOOD.....	19		

## FIGURES

FIG. 1 — TOTAL AREA CLASSIFICATION INTO BROAD LAND CLASSES, KENORA DISTRICT.....	9	FIG. 10 — VOLUME OF THE PRIMARY GROWING STOCK ON PATENTED LAND BY SIZE CLASSES.....	20
FIG. 2 — LAND OWNERSHIP WITHIN THE KENORA DISTRICT.....	11	FIG. 11 — VOLUME OF PRIMARY GROWING STOCK OF CONIFEROUS SPECIES ON CROWN LAND BY AGE CLASSES AND SIZE CLASSES.....	21
FIG. 3 — KENORA DISTRICT, 1953.....	11	FIG. 12 — VOLUME OF THE PRIMARY GROWING STOCK OF HARDWOOD SPECIES ON CROWN LAND BY AGE AND SIZE CLASSES.....	21
FIG. 4 — ECOLOGICAL DIVISIONS.....	13	FIG. 13 — VOLUME OF MATURE TIMBER BY SIZE CLASSES ON PATENTED LAND.....	22
FIG. 5 — CLASSIFICATION OF PRODUCTIVE FOREST LAND INTO COVER TYPES.....	14	FIG. 14 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON CROWN LANDS IN THE KENORA DISTRICT.....	23
FIG. 6 — VOLUME OF THE PRIMARY GROWING STOCK IN MATURE AND IMMATURE AGE CLASSES BY OWNERSHIP.....	16	FIG. 15 — TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON PATENTED LANDS, KENORA DISTRICT.....	24
FIG. 7 — VOLUME OF PRIMARY GROWING STOCK ON CROWN LAND BY SPECIES AND AGE CLASSES.....	18	FIG. 16 — ANNUAL ALLOWABLE CUT AND ANNUAL ACTUAL CUT BY SPECIES ON CROWN LANDS IN THE KENORA DISTRICT.....	25
FIG. 8 — VOLUME OF PRIMARY GROWING STOCK ON PRODUCTIVE FOREST LAND BY SIZE CLASSES.....	19	FIG. 17 — AREA COMPANY INVENTORY USED.....	26
FIG. 9 — VOLUME OF THE PRIMARY GROWING STOCK ON CROWN LAND BY SIZE CLASSES.....	20		





# SURVEY HIGHLIGHTS

1. The total area of the Kenora district is 7,772,562 acres or 12,145 square miles. Productive forest lands cover 67 per cent of the total area, water 25 per cent, non-productive forest land 7 per cent and non-forested land 1 per cent.

2. Of the total area, 96 per cent is Crown land and 4 per cent patented land. If only the productive forest land is considered, a similar distribution of ownership is obtained.

3. For the productive forest the age class distribution shows: 42 per cent mature, 42 per cent immature, 14 per cent young growth and 2 per cent reproducing forest.

4. The cover type distribution for the productive forest and Crown forest areas is similar. The coniferous type occupies 47 per cent, the mixedwoods type 44 per cent and the hardwood type 7 per cent. The remaining 2 per cent is reproducing forest.

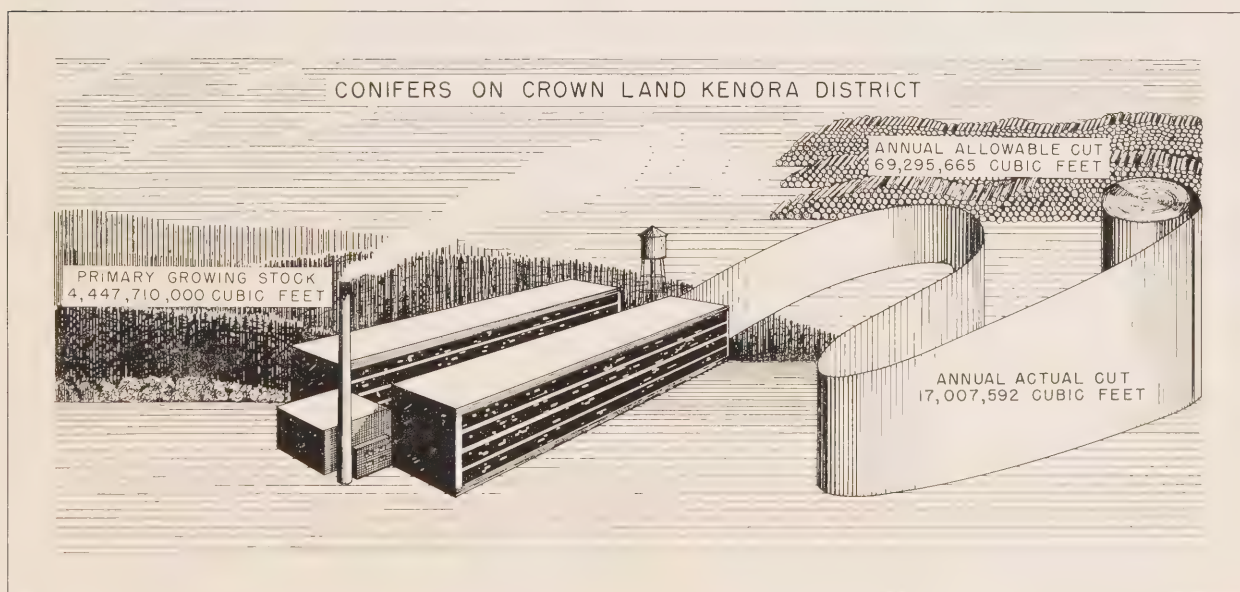
5. The volume of the primary growing stock on Crown lands in the Kenora district is 7,040,085,900 cubic feet or 1,411 cubic feet per acre. Conifers comprise 63 per cent of the total volume on Crown lands.

6. On Crown lands the mature age class has 2,234 million cubic feet or 55 per cent of its volume

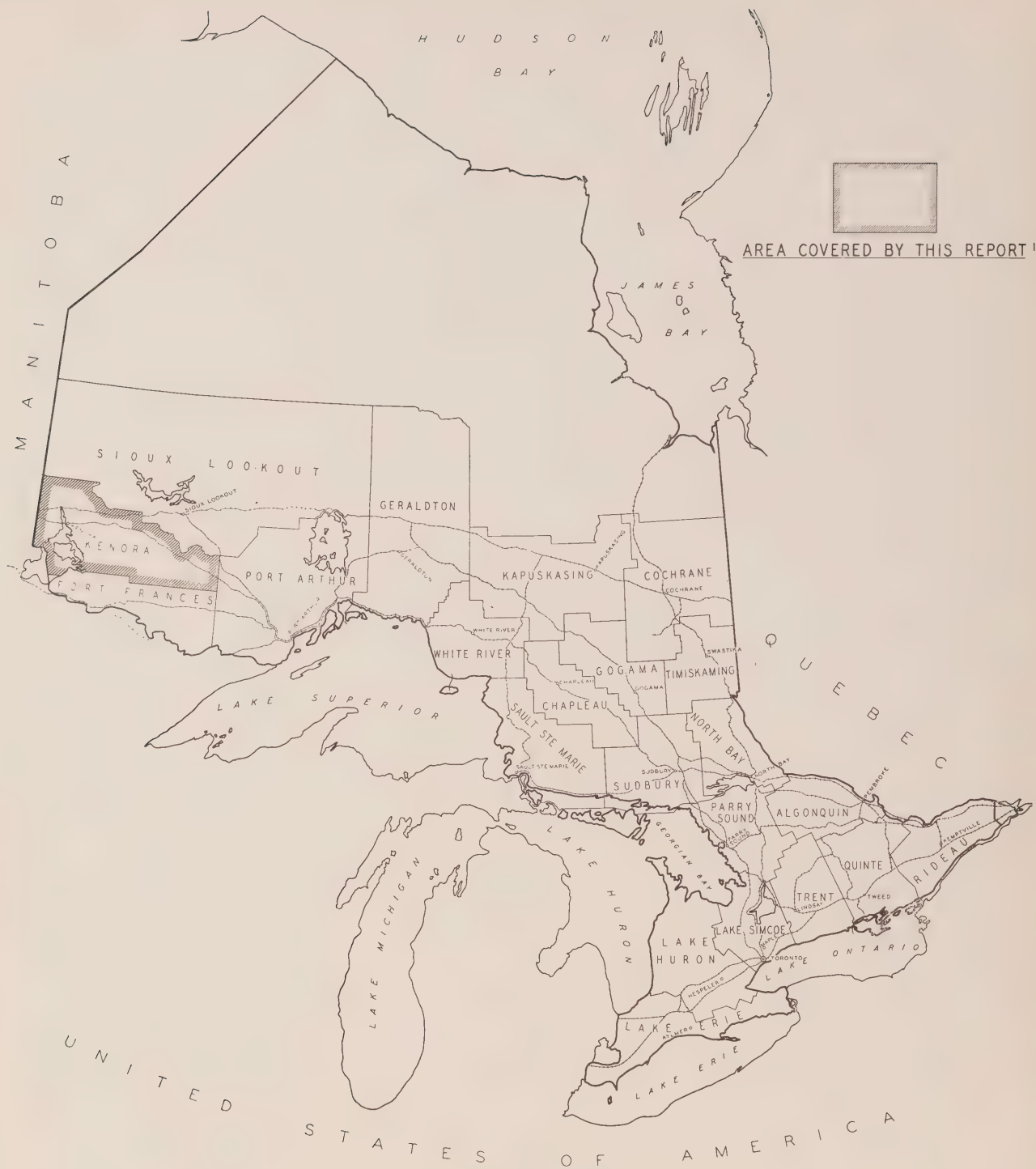
in the 4-9 inch size class and 1,826 million cubic feet or 45 per cent in the 10 inch and over size class. The sawlog size class contains 38 per cent of the mature coniferous volume and 57 per cent of the mature hardwood volume. Jack pine produces 49 per cent of the mature softwood sawlog volume. It is followed by white spruce with 21 per cent.

7. The annual allowable cut from Crown lands in the Kenora district is 135,402,060 cubic feet. Conifers comprise 51 per cent of this volume, and hardwoods 49 per cent. The coniferous allowable cut is made up of 55 per cent jack pine, 31 per cent white and black spruce, 10 per cent balsam fir, 3 per cent white and red pine and one per cent other conifers. The hardwood allowable cut is 87 per cent poplar and 13 per cent white birch.

8. A comparison of the allowable cut with the actual utilization shows that only 25 per cent of the coniferous allowable cut was utilized, while less than one per cent of the hardwood allowable cut was taken. Of the wood utilized annually, jack pine comprised 47 per cent and spruce 46 per cent. These species make up 93 per cent of the actual cut; however, only 21 per cent of the allowable cut for jack pine and only 38 per cent of the allowable cut for spruce was utilized.







MAP  
OF  
THE PROVINCE OF ONTARIO  
SHOWING  
ADMINISTRATIVE DISTRICTS  
OF THE  
DEPARTMENT OF LANDS AND FORESTS

SCALE OF MILES  
0 20 40 60 80 100

MARCH, 1933





*Forest resources inventory photograph of the City of Kenora taken, with a six-inch focal length aerial camera, from an altitude of 7,920 feet. Scale of photograph: 4 inches to the mile.*



# FOREST INVENTORY

## Areas



● The total area of the Kenora district, excluding Indian Reserve lands, is 7,772,562 acres (table 1), 12,145 square miles. Water covers an area of 1,938,874 acres, 25 per cent of the total area, leaving a net land area of 5,833,688 acres. Non-productive forest lands, which appear to be permanently unfit for commercial timber production, due to very low productivity, occupy 524,840 acres or slightly under 7 per cent of the total area and 9 per cent of the land area. Non-forested land, including lands permanently withdrawn from timber production, comprises 100,041 acres or one per cent of the total area (fig. 1). In this classification is the small area

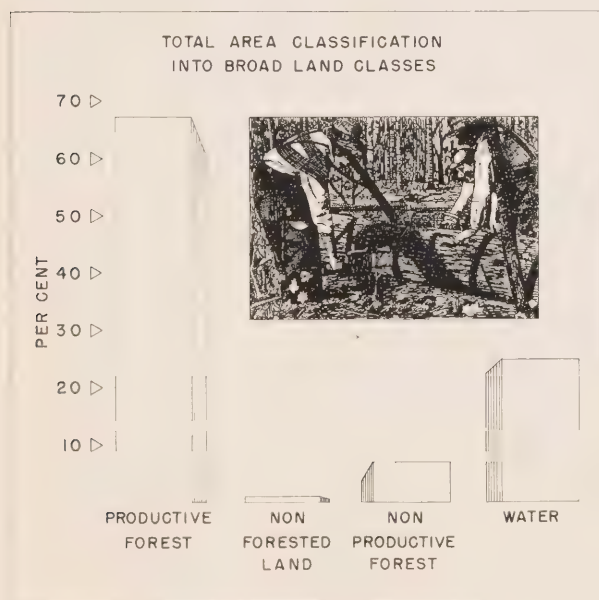


FIGURE 1

of developed agricultural land of 35,930 acres, pasture lands totalling 5,030 acres, non-reproducing burns of 435 acres and lands occupied by cities, towns, villages, roads and railroads, or otherwise withdrawn from forest production, amounting to 58,646 acres.

The Kenora district, with 5,208,807 acres or 67 per cent of the total area classified as productive forest land, is an important timber producing area.

The city of Kenora, standing at the point where Lake of the Woods drains into the Winnipeg river, is the important commercial and industrial centre of the district. The pulp and paper industry, established in the early part of the present century at Kenora, has grown to the large industrial plant of the area manufacturing sulphite and groundwood pulp and newsprint paper. At a somewhat later date the sulphate process was installed in a large

TABLE 1. — *Total area classification into broad land and ownership groupings.*

Kind of area	Crown land	Patented land	Total
	acres	acres	acres
Productive forest land <sup>1</sup> .....	4,990,219	218,588	5,208,807
Non-forested land <sup>2</sup>			
Developed agricultural land.....	3,346	32,584	35,930
Grass and meadow land.....	2,688	2,342	5,030
Non-reproducing burn.....	417	18	435
Unclassified land <sup>3</sup> .....	50,336	8,310	58,646
TOTAL.....	56,787	43,254	100,041
Non-productive forest <sup>4</sup>			
Open muskeg.....	112,399	2,858	115,257
Treed muskeg (scrub).....	258,279	12,088	270,367
Brush, alder, and flooded land....	80,728	7,050	87,778
Rock outcrop.....	25,980	390	26,370
Barrens.....	25,068		25,068
TOTAL.....	502,454	22,386	524,840
Water.....	1,938,874		1,938,874
TOTAL AREA.....	7,488,334	284,228	7,772,562

<sup>1</sup> Land bearing or capable of bearing timber of a commercial character and not withdrawn from such use.

<sup>2</sup> Productive forest lands permanently withdrawn from timber production use.

<sup>3</sup> Lands occupied by roads, railroads, towns, etc.

<sup>4</sup> Lands which appear to be permanently out of commercial timber producing class, owing to very low productivity.





*Forest Biology Rangers measuring lengths of curled larch twigs and numbers of larch sawfly eggs deposited in them as part of intensive studies of this insect being carried out at the Forest Insect Laboratory.*

plant at Dryden utilizing jack pine from which kraft paper and products are manufactured. The sawmilling industry early established, utilizing the extensive virgin red and white pine resources of the district, is continuing to be maintained by utilizing jack pine and spruce.

One-quarter of the total area of the district is covered by inland water bodies, the largest lakes being Lake of the Woods, Eagle lake and Vermillion and Wabigoon lakes. These, along with innumerable lakes large and small, have favoured the extensive recreational use of the forests; a development of increasing importance to the economy of the district.

The thin rocky soils characteristic of the district leave little opportunity for general agricultural development. Lands suitable for farming are found

in the Dryden area where a thriving community is well established. Elsewhere in the district only limited areas have attracted agricultural settlement.

### *Forest Land Ownership*



It has been the policy in Ontario from the very beginning to retain forest land in public ownership, leasing to operators for varying lengths of time the right to cut and remove timber from the public domain. Lands suitable for agriculture have been opened for settlement, and lands have been granted or sold under the various land settlement regulations which have been in force from time to time. Lands are also patented for mining purposes, summer resort and for other uses. All these various types of ownership are grouped under "patented lands," which include all lands owned privately in contrast to Crown lands. It has been the usual practice in Ontario, except on lands patented for agricultural purposes, to reserve all pine timber to the Crown at the time letters patent are issued, while on some lands patented for mining, all timber is reserved to the Crown. The ownership of timber on privately owned lands presents, therefore, a complicated picture. In the course of the inventory no attempt was made to record separately, timber occurring on patented land but reserved to and owned by the Crown.

Of the total area of the Kenora district of 7,772,562 acres, 7,488,334 acres are in the ownership of the Crown, and 284,228 acres are patented land (table 1). Considering the total area of the district, 96 per cent is Crown land and 4 per cent patented land. If only the productive forest land, totalling 5,208,807 acres, is considered, 4,990,219 acres or 96 per cent is Crown land and 218,588 acres or 4 per cent is patented land (fig. 2). Patented land is further

classified on a township basis into townships containing less than 10 per cent patented land; those containing between 10 and 50 per cent patented land and townships over 50 per cent patented land (fig. 3). Only 6 townships in the district contain over 50 per cent patented land.

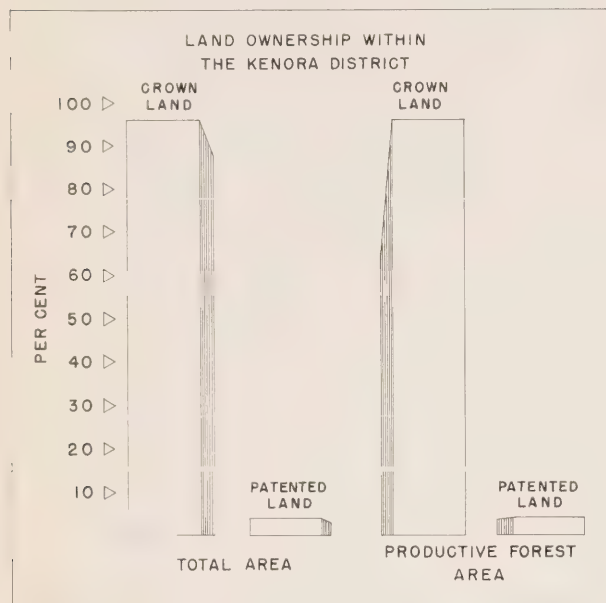
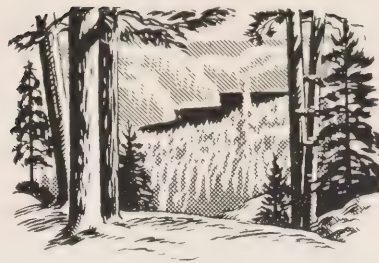


FIGURE 2

### Age Classes



The forests of Ontario generally show a preponderance of the mature age class which should be cut at a uniform rate to produce a sustained balanced cut from year to year. The considerable accumulation of mature timber in the province permits a gradual normalization of age classes to be brought about, and thus create a sound foundation for a balanced sustained yield in the future. During the period of gradual normalization of age classes a portion of mature and over-mature timber will be held over and above its mature age. This may involve some losses in those stands where progressing cull may not be balanced by volume increment in ageing stands. The long term benefits will adequately compensate for any current losses.

In the Kenora district 2,176,042 acres or 42 per cent of the productive forest is in the mature age

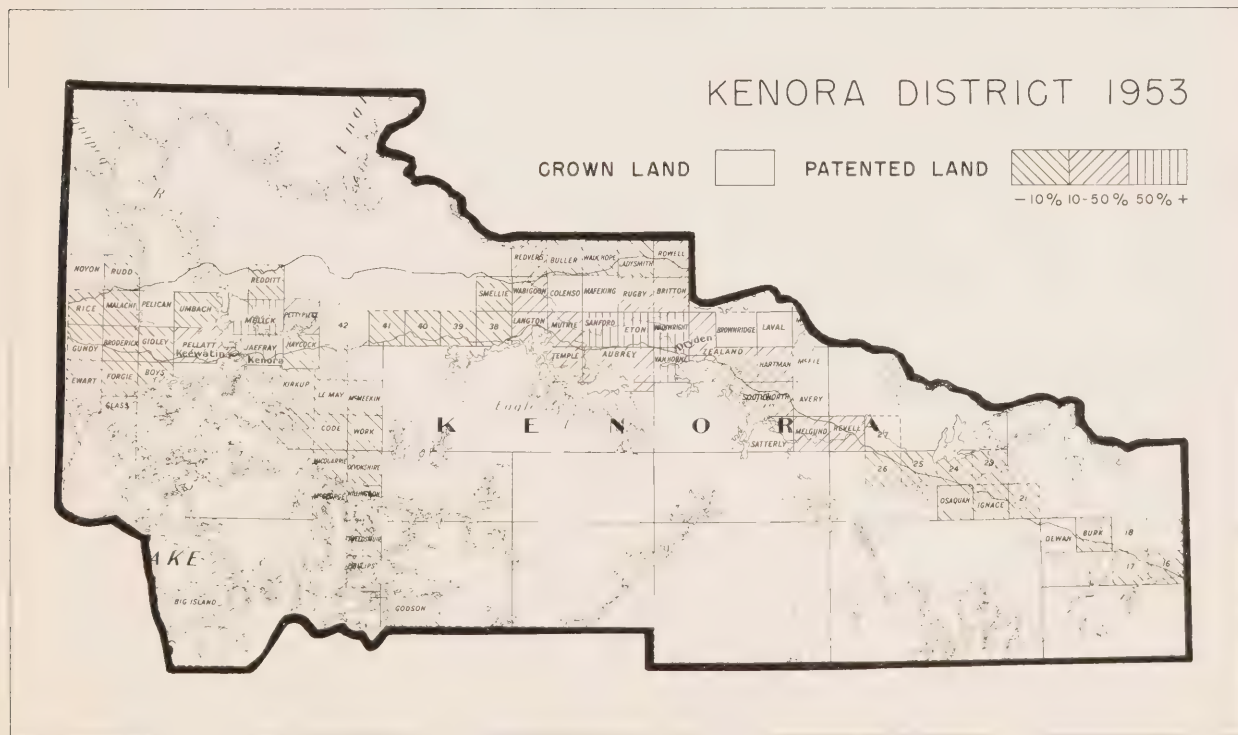


FIGURE 3



TABLE 2. — *Classification of productive forest land into types and age classes.*

Age class and cover type	Crown land	Patented land	Total	
	acres	acres	acres	per cent
Mature forest:				
Coniferous.....	1,035,040	24,162	1,059,202	20
Hardwood.....	114,809	11,118	125,927	3
Mixedwoods.....	928,549	62,364	990,913	19
TOTAL.....	2,078,398	97,644	2,176,042	42
Immature forest:				
Coniferous.....	1,057,774	24,370	1,082,144	21
Hardwood.....	139,943	14,454	154,397	3
Mixedwoods.....	882,503	52,534	935,037	18
TOTAL.....	2,080,220	91,358	2,171,578	42
Young growth:				
Coniferous.....	279,561	2,460	282,021	5
Hardwood.....	93,720	994	94,714	2
Mixedwoods.....	367,596	7,184	374,780	7
TOTAL.....	740,877	10,638	751,515	14
Reproducing forest.....	90,724	18,948	109,672	2
TOTAL PRODUCTIVE FOREST.....	4,990,219	218,588	5,208,807	100

class (table 2). This may be considered as a reserve which can be drawn on as required to balance the annual cut from year to year, and give the management of the timber resources some flexibility in meeting excessive demands in times of stress. Once the mature timber is completely removed, any increased drain on the forest can be met only by reducing the growing stock. This action, if continued, will reduce the overall production of the forest. Almost an equal area of 2,171,578 acres or 42 per cent of the productive forest is in the immature age class. This area will become mature progressively over the next 60 years, and will supply industry after the mature timber has been cut and removed. There are 751,515 acres or 14 per cent of the productive forest in the young growth class and 109,672 acres or 2 per cent in the reproducing forest class. These latter areas, aggregating only 16 per cent of the productive area, will supply the cut for 30 to 40 years after the mature and the immature timber has been cut, and unless some of the timber in presently immature stands is held over to support the cut during this period, a very marked decline in the allowable cut would take place. With careful planning the present age class distribution can be used to supply approximately

equal annual cuts, and, for many years, emergencies in timber requirements can be met out of presently matured stands.

The age class distribution for the 218,588 acres of privately owned lands shows 97,644 acres or 45 per cent mature; 91,358 acres or 42 per cent immature; 10,638 acres or 5 per cent young growth; and 18,948 acres or 8 per cent reproducing forest.

### *Regional Forest Types*



The forested area of the province has been divided into regions or ecological sections based on a broad uniformity of tree species associations resulting from climatic changes from south to north and from east to west in the Province. Various additional factors, such as the proximity of large bodies of water, topography, soil characteristics and other local conditions, contribute to modify the response of forest growth to the overall climatic conditions.

Maps showing the regional distribution of forests and forest types in Ontario have been prepared and published on previous occasions. The regional classification used for the forest resources inventory resembles these earlier maps in general outline, but owing to the use of the regional distribution in making volume estimates for cover type aggregates, the boundaries have been laid down in greater detail. Separate volume and yield tables are prepared for each region or section, and they serve as units in the compilation of volume estimates.

In the Kenora district four forest regions or sections are represented (fig. 4), as follows:

1. The Quetico section in the southeasterly portion of the district, covers 21 per cent of the total area.
2. The Western Transition section in the northeasterly part of the district, covers 29 per cent of the total area.
3. The English River section covering the western portion of the district, comprises 50 per cent of the total area.



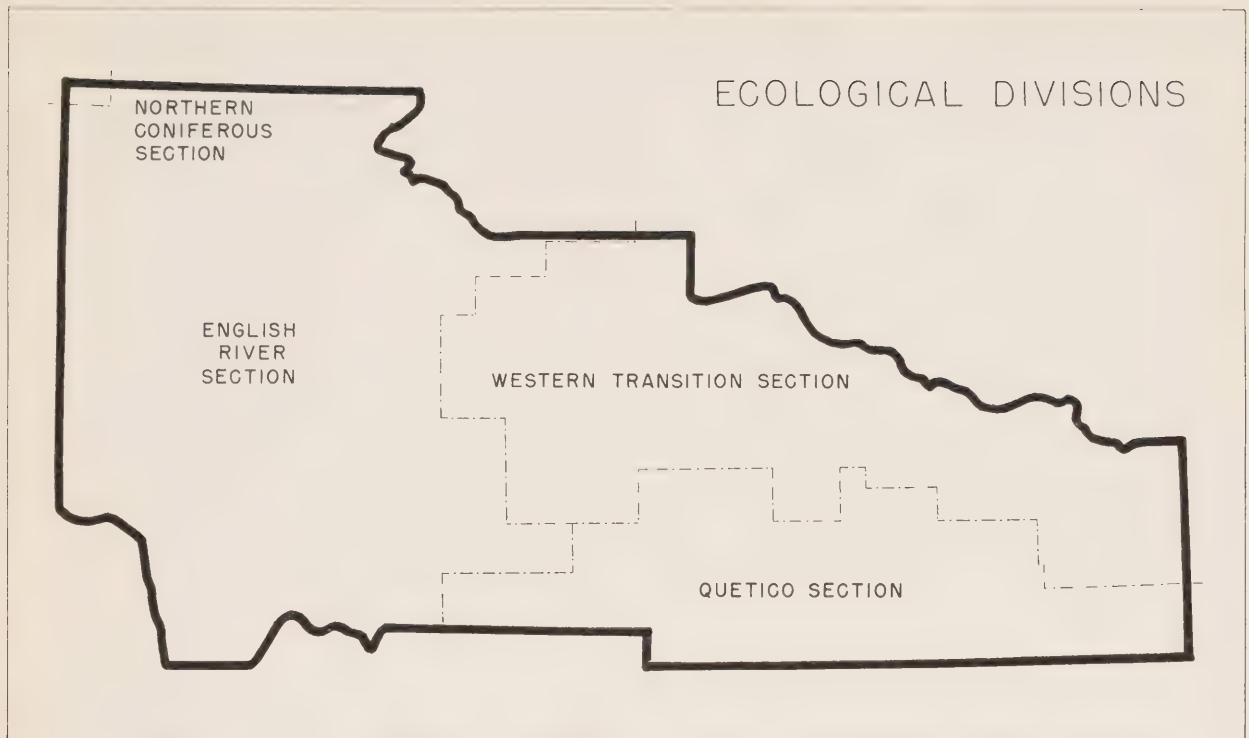


FIGURE 4

4. The Northern Coniferous section, comprising only a fraction of one per cent of the total area, appears in the extreme northwest corner of the district.

The Quetico section, an extension of the Great Lakes-St. Lawrence forest, lies along the International Boundary between Lake Superior and Lake of the Woods. It extends into the southerly portions of the Kenora district. The soils are a thin, light-textured mantle covering the bed-rock. Lakes with rocky shores are numerous in the depressions of a generally rough terrain. Red and white pine stands, with white birch as about the only hardwood component of the mature forest, are characteristic of the area. Following forest fires, these stands tend to be replaced by jack pine and poplar with an admixture of spruce and balsam fir. Red maple of poor form is common throughout the section, but hard maple and other tolerant hardwoods are absent or occur as rare outliers of the eastern hardwood forests.

The Western Transition section, lying in the northeasterly portion of the district, belongs to the Boreal forest zone. It is marked by a rough,

rolling topography with thin soils and numerous lakes. A characteristic of the region is the wide distribution of red and white pine as scattered individuals or as isolated stands. The principal species are jack pine and black spruce. Mixtures of black and white spruce, balsam fir, poplar and white birch are common.

The English River section, lying at the extreme western side of Ontario where it adjoins the Province of Manitoba, contains the maze of water and islands of the Lake of the Woods area. The soils are generally thin, with heavier soils in the valleys laid down in post-glacial Lake Agassiz. White and red pine have a limited occurrence on islands and on the rocky shorelines of the numerous lakes of the section. Jack pine is the most abundant species, and with black and white spruce and balsam fir forms most of the forests. Good growth of poplar is found on the clay bottomlands.

The Northern Coniferous section, common to the district to the north, is represented in the Kenora district only by a very small area. The forests of this region are distinctly of the northern type dominated by spruce and balsam of slow growth.

## Cover Types



The forests of the Kenora district are made up of 12 common tree species; six of these comprise 96 per cent of the total wood volume. These are: poplar forming 30 per cent of the growing stock; jack pine 28 per cent; black spruce 20 per cent; white birch 7 per cent; balsam fir 6 per cent; and white spruce 5 per cent. Represented in the forests are red and white pine, larch, white cedar, red maple and ash.

The forests are described under three main cover types, coniferous, hardwood and mixedwoods. The coniferous type contains 75 per cent or more conifers or softwood trees; the hardwood type, 75 per cent

TABLE 3. —Classification of productive forest lands into cover types.

Cover type and age class	Crown land		Patented land		Total	
	acres	per cent	acres	per cent	acres	per cent
Coniferous type:						
Mature.....	1,035,040	21	24,162	11	1,059,202	20
Immature.....	1,057,774	21	24,370	11	1,082,144	21
Young growth.....	279,561	5	2,460	1	282,021	6
TOTAL.....	2,372,375	47	50,992	23	2,423,367	47
Hardwood type:						
Mature.....	114,809	2	11,118	5	125,927	2
Immature.....	139,943	3	14,454	7	154,397	3
Young growth.....	93,720	2	994	*	94,714	2
TOTAL.....	348,472	7	26,566	12	375,038	7
Mixedwoods type:						
Mature.....	928,549	19	62,364	29	990,913	19
Immature.....	882,503	18	52,534	24	935,037	18
Young growth.....	367,596	7	7,184	3	374,780	7
TOTAL.....	2,178,648	44	122,082	56	2,300,730	44
Reproducing forest.....	90,724	2	18,948	9	109,672	2
TOTAL PRODUCTIVE FOREST.....	4,990,219	100	218,588	100	5,208,807	100

\* Less than one per cent.

or more hardwood or broadleaved trees. All other combinations are classed as mixedwoods. In addition to the three main cover types, there occur on all large forest tracts, areas of reproducing forests too recently established to have attained a sufficiently stable composition to be classified into cover types. These areas are referred to as reproducing forest.

Cover type distribution over the productive forest and Crown forest areas is similar, with the coniferous type occupying 47 per cent of the area (table 3), closely followed by the mixedwoods type which covers 44 per cent. The hardwood type occupies 7 per cent of the productive and Crown forest areas, and the remaining 2 per cent is reproducing forest (fig. 5).

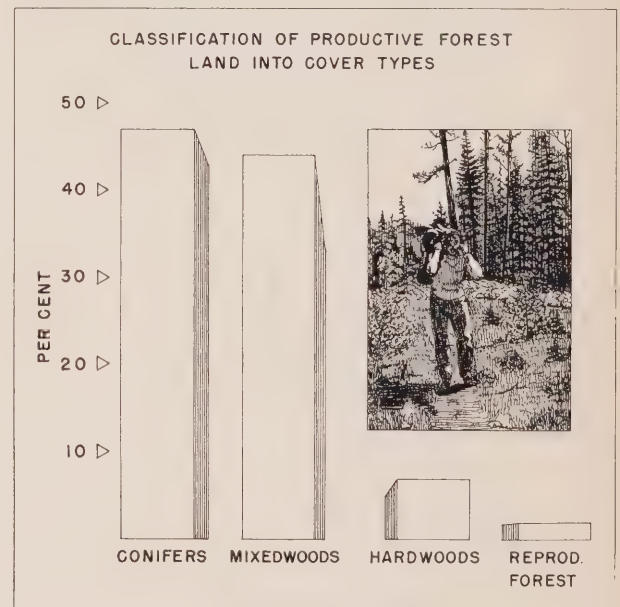
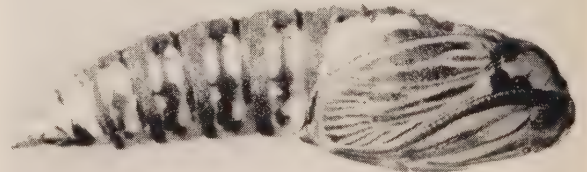


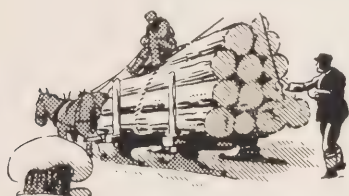
FIGURE 5



Pupa of spruce budworm.

The 218,588 acres of patented productive forest land within the district shows a quite different cover type distribution. Here the mixedwoods type predominates, occupying 56 per cent of the area. It is followed by the coniferous type with 23 per cent, and the hardwood type with 12 per cent. The remaining 9 per cent is reproducing forest.

#### *Volume*



The volume of the primary growing stock includes all living trees 3.6 inches d.b.h. outside bark and over, standing on the productive forest lands of the

district; it consists of the wood volume inside bark in cubic feet, including stump and top and cull or defective portions of living trees, but excludes all limb wood.

The volume of the primary growing stock on productive forest lands in the Kenora district is over 7 billion cubic feet (7,377,637,300 cubic feet). This is an average of 1,416 cubic feet per acre (table 4). The mature age class contains 4.3 billion cubic feet (table 5) or 1,961 cubic feet per acre, while the immature age class contains 3.1 billion cubic feet or 1,432 cubic feet per acre (fig. 6).

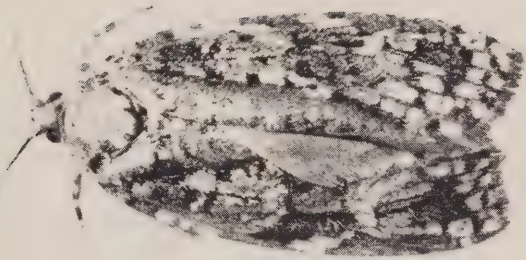
On Crown lands the volume of the primary growing stock is 7,040 million cubic feet (table 6) or an average of 1,411 cubic feet per acre. The mature age class contains 4,060 million cubic feet or 1,954 cubic feet per acre; the immature age class has 2,980 cubic feet or 1,432 cubic feet per acre.

Patented lands in the Kenora district have a total of 338 million cubic feet (table 7) or 1,544



*Egg mass and mature larva of the spruce budworm (enlarged).*





Adult moth of the spruce budworm.

cubic feet per acre. The mature age class contains 208 million cubic feet or 2,127 cubic feet per acre and the immature age class contains 130 million cubic feet or 1,422 cubic feet per acre (fig. 6).

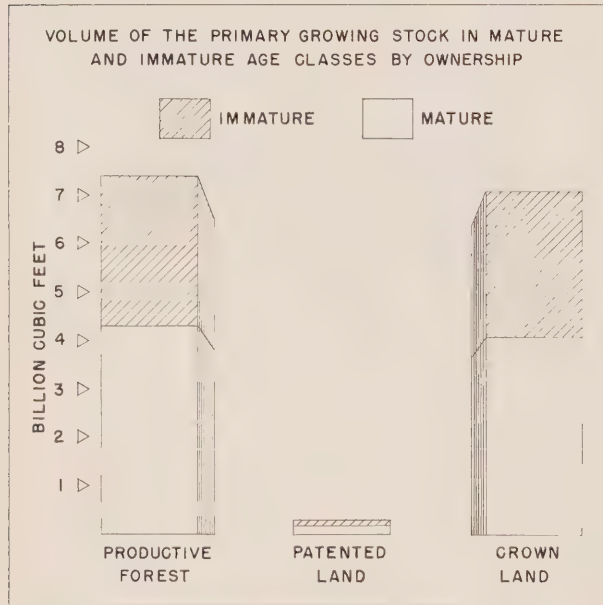


FIGURE 6

TABLE 4. — Volume per acre of the primary growing stock.

	Crown land			Patented land			Average Total
	4''-9'' d.b.h.	10'' + d.b.h.	Average	4''-9'' d.b.h.	10'' + d.b.h.	Average	
	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	
Mature.....	1,075	879	1,954	1,099	1,028	2,127	1,961
Immature.....	1,118	314	1,432	1,123	299	1,422	1,432
Productive forest.....	914	497	1,411	960	584	1,544	1,416

TABLE 5. — Cubic-foot volumes of primary growing stock on productive forest land (Crown plus patented land) in the Kenora district by species groups, age class and cover type in two size classes.

ALL SPECIES

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,217,405	649,241	1,260,364	246,174	3,373,184
Hardwood.....	131,535	141,121	152,734	47,440	472,830
Mixedwoods....	992,467	1,136,270	1,015,595	387,291	3,531,623
TOTAL.....	2,341,407	1,926,632	2,428,693	680,905	7,377,637

ALL CONIFERS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,091,067	523,502	1,115,983	181,243	2,911,795
Hardwood.....	12,267	12,101	15,266	11,117	50,751
Mixedwoods....	523,527	460,893	499,663	176,857	1,660,940
TOTAL.....	1,626,861	996,496	1,630,912	369,217	4,623,486

ALL HARDWOODS

Cover type	Mature		Immature		Total all lands
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	126,338	125,739	144,381	64,931	461,389
Hardwood.....	119,268	129,020	137,468	36,323	422,079
Mixedwoods....	468,940	675,377	515,932	210,434	1,870,683
TOTAL.....	714,546	930,136	797,781	311,688	2,754,151

TABLE 6. — *Cubic-foot volumes of primary growing stock on Crown land in the Kenora district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,186,687	633,316	1,232,267	242,514	3,294,784
Hardwood.....	120,087	129,699	138,150	43,467	431,403
Mixedwoods....	927,296	1,063,276	955,709	367,618	3,313,899
TOTAL.....	2,234,070	1,826,291	2,326,126	653,599	7,040,086

ALL CONIFERS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	1,062,847	511,063	1,090,178	178,556	2,842,644
Hardwood.....	11,287	10,935	13,988	10,016	46,226
Mixedwoods....	488,562	431,402	470,245	168,631	1,558,840
TOTAL.....	1,562,696	953,400	1,574,411	357,203	4,447,710

ALL HARDWOODS					
Cover type	Mature		Immature		Total Crown land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	123,840	122,253	142,089	63,958	452,140
Hardwood.....	108,800	118,764	124,162	33,451	385,177
Mixedwoods....	438,734	631,874	485,464	198,987	1,755,059
TOTAL.....	671,374	872,891	751,715	296,396	2,592,376

TABLE 7. — *Cubic-foot volumes of primary growing stock on patented land in the Kenora district by species groups, age class and cover type in two size classes.*

ALL SPECIES					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	30,718	15,925	28,097	3,660	78,400
Hardwood.....	11,448	11,422	14,584	3,973	41,427
Mixedwoods....	65,171	72,994	59,886	19,673	217,724
TOTAL.....	107,337	100,341	102,567	27,306	337,551

ALL CONIFERS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	28,220	12,439	25,805	2,687	69,151
Hardwood.....	980	1,166	1,278	1,101	4,525
Mixedwoods....	34,965	29,491	29,418	8,226	102,100
TOTAL.....	64,165	43,096	56,501	12,014	175,776

ALL HARDWOODS					
Cover type	Mature		Immature		Total patented land
	4''-9'' d.b.h.	10'' up d.b.h.	4''-9'' d.b.h.	10'' up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
Coniferous.....	2,498	3,486	2,292	973	9,249
Hardwood.....	10,468	10,256	13,306	2,872	36,902
Mixedwoods....	30,206	43,503	30,468	11,447	115,624
TOTAL.....	43,172	57,245	46,066	15,292	161,775

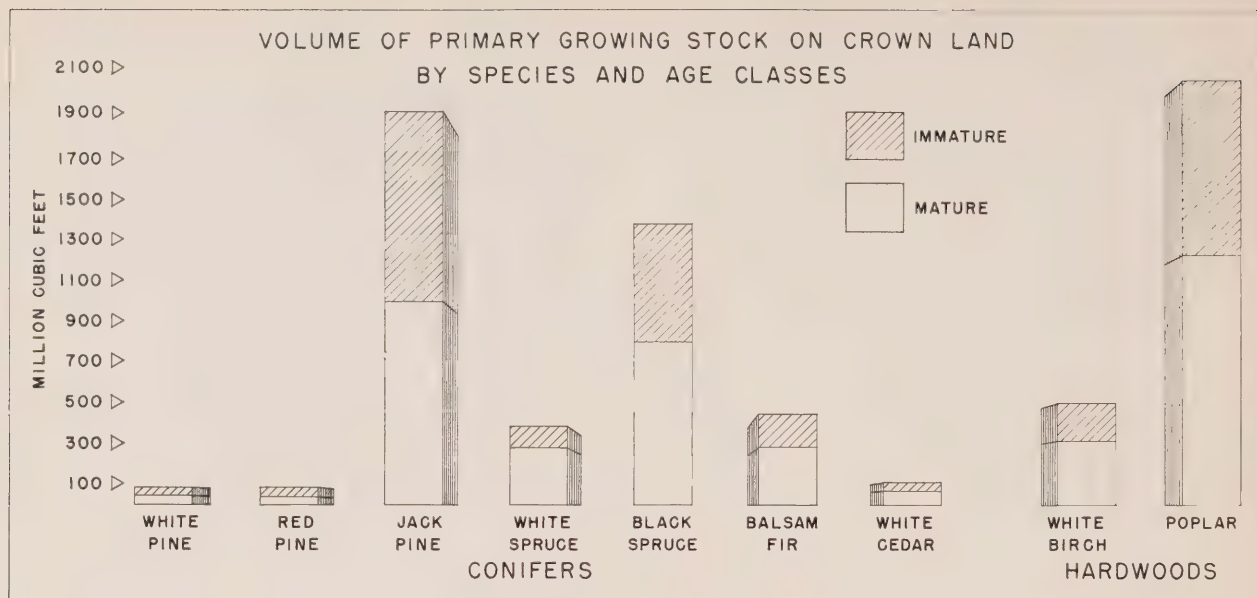


FIGURE 7

### Conifers vs. Hardwoods

The volume of the primary growing stock on productive forest land in the Kenora district is 63 per cent coniferous and 37 per cent hardwood. Conifers total 4,623 million cubic feet and hardwoods 2,754 million cubic feet (table 8). Of the total volume in the mature age class, conifers comprise 2,623 million cubic feet or 61 per cent and hardwoods, 1,645 million cubic feet or 39 per cent. The immature age class contains 2,000 million cubic feet or 64 per cent coniferous volume and 1,109 million cubic feet or 36 per cent hardwood volume.

On Crown lands 4,448 million cubic feet is coniferous volume and 2,592 million cubic feet hardwood volume (table 9). This gives the same percentage distribution for conifers and hardwoods as for the productive forest area. Both mature and immature age classes on Crown land show a one per cent increase in coniferous volume when compared to the distribution on the productive forest area.

On patented lands the volume of conifers is about 176 million cubic feet or 52 per cent of the total volume, while the volume of hardwoods is 162 million cubic feet or 48 per cent of the total volume (table 10). In the mature age class this same percentage distribution between conifers and hardwoods holds true, while in the immature age class conifers comprise 53 per cent of the volume and hardwoods 47 per cent.

The most important conifer is jack pine which makes up 44 per cent of the total cubic volume of conifers on Crown lands (fig. 7). It is followed by

TABLE 8. — *Cubic-foot volumes of primary growing stock on productive forest land in the Kenora district by species and age classes in two size classes.*

Species	Mature		Immature		Total all lands
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	1,922	43,040	9,197	31,759	85,918
Red pine.....	2,295	33,258	16,257	31,537	83,347
Jack pine.....	552,137	487,662	810,973	178,770	2,029,542
White spruce...	86,931	208,428	56,024	53,521	404,904
Black spruce...	693,458	141,895	566,547	40,443	1,442,343
Balsam fir.....	249,681	52,697	146,401	18,070	466,849
White cedar.....	39,994	29,396	24,544	15,003	108,937
Larch.....	443	120	969	114	1,646
TOTAL CONIFERS....	1,626,861	996,496	1,630,912	369,217	4,623,486
White birch.....	227,292	110,155	168,352	28,838	534,637
Poplar.....	484,294	819,427	626,706	282,410	2,212,837
Red maple.....	565	104	1,659	199	2,527
Ash.....	2,395	450	1,064	241	4,150
TOTAL HARDWOODS	714,546	930,136	797,781	311,688	2,754,151
TOTAL ALL SPECIES....	2,341,407	1,926,632	2,428,693	680,905	7,377,637



black spruce with 31 per cent, balsam fir 10 per cent, white spruce 9 per cent, white cedar 2 per cent. White and red pine, once the most important lumber species of the district, now form only 2 per cent of the total volume on Crown lands.

Poplar is the most abundant hardwood, comprising 81 per cent of the hardwood volume on Crown lands. The proportion of white birch is reduced to only 19 per cent of the hardwood volume. Other hardwoods are sparsely represented in the forests of the district.

TABLE 9. — *Cubic-foot volumes of primary growing stock on Crown land in the Kenora district by species and age classes in two size classes.*

Species	Mature		Immature		Total Crown land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	1,919	42,972	9,182	31,734	85,807
Red pine.....	2,287	33,106	16,139	31,490	83,022
Jack pine.....	533,591	467,689	784,391	172,174	1,957,845
White spruce...	82,694	198,382	53,750	51,017	385,843
Black spruce...	666,182	133,566	545,088	38,559	1,383,395
Balsam fir.....	235,870	48,291	140,416	17,126	441,703
White cedar.....	39,710	29,274	24,532	14,993	108,509
Larch.....	443	120	913	110	1,586
<b>TOTAL CONIFERS.....</b>	<b>1,562,696</b>	<b>953,400</b>	<b>1,574,411</b>	<b>357,203</b>	<b>4,447,710</b>
White birch.....	211,817	100,251	159,264	27,655	498,987
Poplar.....	456,598	772,086	589,737	268,308	2,086,729
Red maple.....	564	104	1,658	199	2,525
Ash.....	2,395	450	1,056	234	4,135
<b>TOTAL HARDWOODS</b>	<b>671,374</b>	<b>872,891</b>	<b>751,715</b>	<b>296,396</b>	<b>2,592,376</b>
<b>TOTAL ALL SPECIES.....</b>	<b>2,234,070</b>	<b>1,826,291</b>	<b>2,326,126</b>	<b>653,599</b>	<b>7,040,086</b>

### Sawlogs vs. Pulpwood

In compiling the inventory, volumes of the primary growing stock are shown for two size classes, the smaller material 4-9 inches d.b.h. and the larger trees 10 inches d.b.h. and over. Volumes in the smaller size class are considered as mainly of value for pulpwood and cordwood material, depending on species, although poles, posts, railway ties and other products may be obtained from this size class. Volumes in the 10 inch and over size class have values for saw timber and other

uses where larger timber is required. From a tree 10 inches d.b.h. outside bark, one sixteen-foot log, 8 inches in diameter at the small end inside bark,

TABLE 10. — *Cubic-foot volumes of primary growing stock on patented land in the Kenora district by species and age classes in two size classes.*

Species	Mature		Immature		Total patented land
	4"-9" d.b.h.	10" up d.b.h.	4"-9" d.b.h.	10" up d.b.h.	
	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.	Thousand cu. ft.
White pine.....	3	68	15	25	111
Red pine.....	8	152	118	47	325
Jack pine.....	18,546	19,973	26,582	6,596	71,697
White spruce...	4,237	10,046	2,274	2,504	19,061
Black spruce...	27,276	8,329	21,459	1,884	58,948
Balsam fir.....	13,811	4,406	5,985	944	25,146
White cedar.....	284	122	12	10	428
Larch.....			56	4	60
<b>TOTAL CONIFERS.....</b>	<b>64,165</b>	<b>43,096</b>	<b>56,501</b>	<b>12,014</b>	<b>175,776</b>
White birch.....	15,475	9,904	9,088	1,183	35,650
Poplar.....	27,696	47,341	36,909	14,102	126,048
Red maple.....	1		1		2
Ash.....			8	7	15
<b>TOTAL HARDWOODS</b>	<b>43,172</b>	<b>57,245</b>	<b>46,006</b>	<b>15,292</b>	<b>161,775</b>
<b>TOTAL ALL SPECIES.....</b>	<b>107,337</b>	<b>100,341</b>	<b>102,567</b>	<b>27,306</b>	<b>337,551</b>

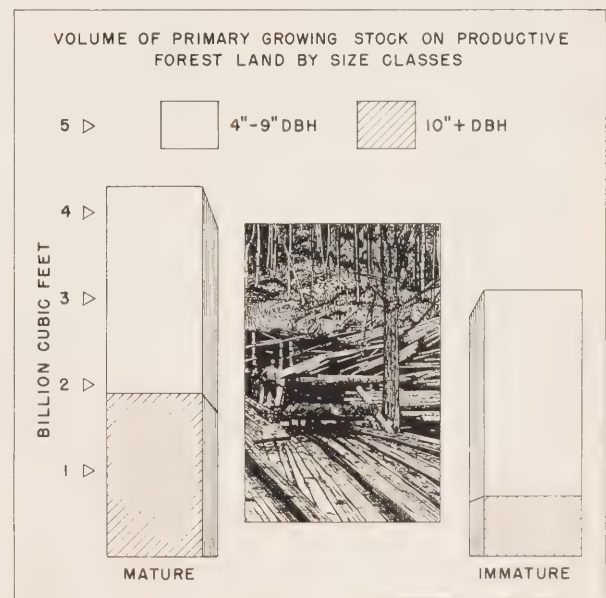


FIGURE 8

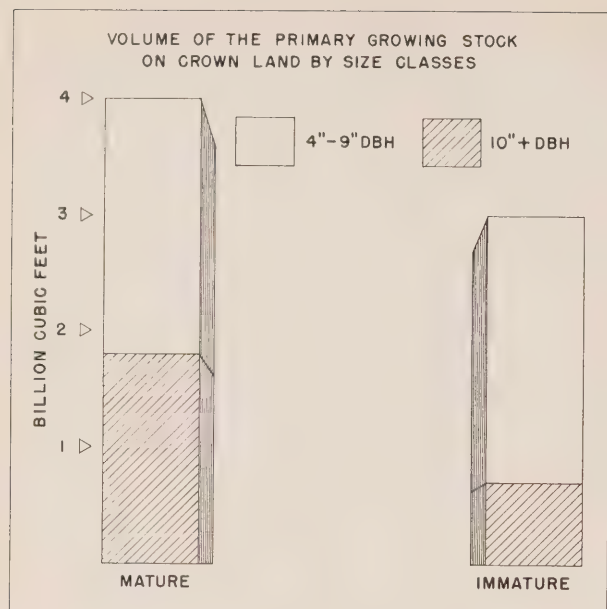


FIGURE 9

can be obtained on the average. The residual smaller size material in the top may be diverted to uses other than saw timber. The residual volume is relatively small and is included with the volumes 10 inches d.b.h. and over in all inventory figures.

Of the volume of the primary growing stock on productive forest lands, 4,770 million cubic feet are in the 4-9 inch class and 2,608 million cubic feet are in the 10 inch d.b.h. class and over (table 8). The 4-9 inch diameter class contains 70 per cent of the coniferous and 55 per cent of the hardwood volume. The mature age class has 2,341 million cubic feet in the 4-9 inch size class and 1,927 million cubic feet 10 inches d.b.h. and over (fig. 8).

On Crown lands the 4-9 inch class contains 4,560 million cubic feet or 65 per cent of the volume and the 10 inch and over class contains 2,480 million cubic feet or 35 per cent of the volume (table 9). The mature age class on Crown lands has 2,234 million cubic feet or 55 per cent of its volume in the pulpwood class and 1,826 million cubic feet or 45 per cent of sawlog size (fig. 9).

Patented lands within the district produce 338 million cubic feet (table 10) of which 62 per cent is in the 4-9 inch class and 38 per cent in the 10 inch and over class. The sawlog size class comprises 48 per cent of the volume of the mature forest (fig. 10).

In the mature forest on Crown land the sawlog size class contains 953 million cubic feet of conifers and 873 million cubic feet of hardwoods (table 9). Conifers have only 38 per cent of the mature volume in the sawlog size class, while hardwoods have 57 per cent of the mature volume in this class. Only three of the coniferous species, white and red pine and white spruce, produce more sawlog than pulpwood material. However, the leading conifer by volume in the sawlog size class is jack pine which produces 49 per cent of the mature softwood sawlog volume (fig. 11). It is followed by white spruce with 21 per cent, black spruce with 14 per cent, and red and white pine with 8 per cent. The remaining 8 per cent is made up of balsam fir, white cedar and larch. It should be noted that for the two principal conifers, jack pine and black spruce, the pulpwood size class contains 53 per cent of the mature jack pine volume and 83 per cent of the mature black spruce.

Poplar and white birch are the principal hardwood species in the district. Hardwoods on Crown lands comprise 37 per cent of the total volume on Crown lands. Poplar is the principal hardwood species, and it forms 88 per cent of the mature hardwood sawlog volume (fig. 12). White birch accounts for 11 per cent and one per cent is composed of minor hardwood species.

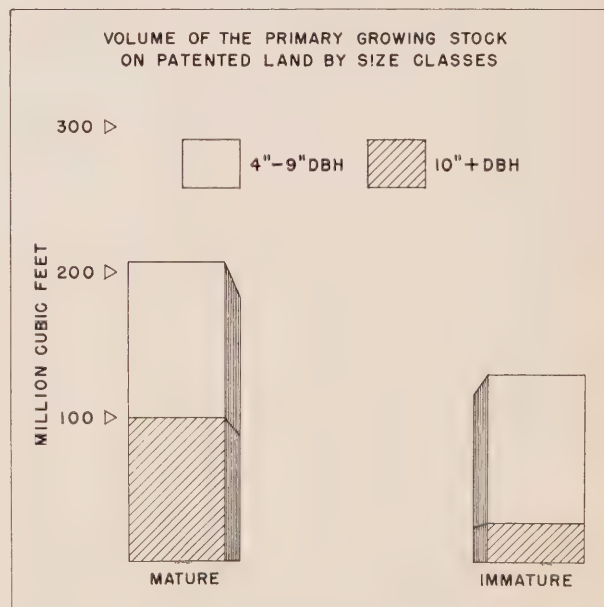


FIGURE 10

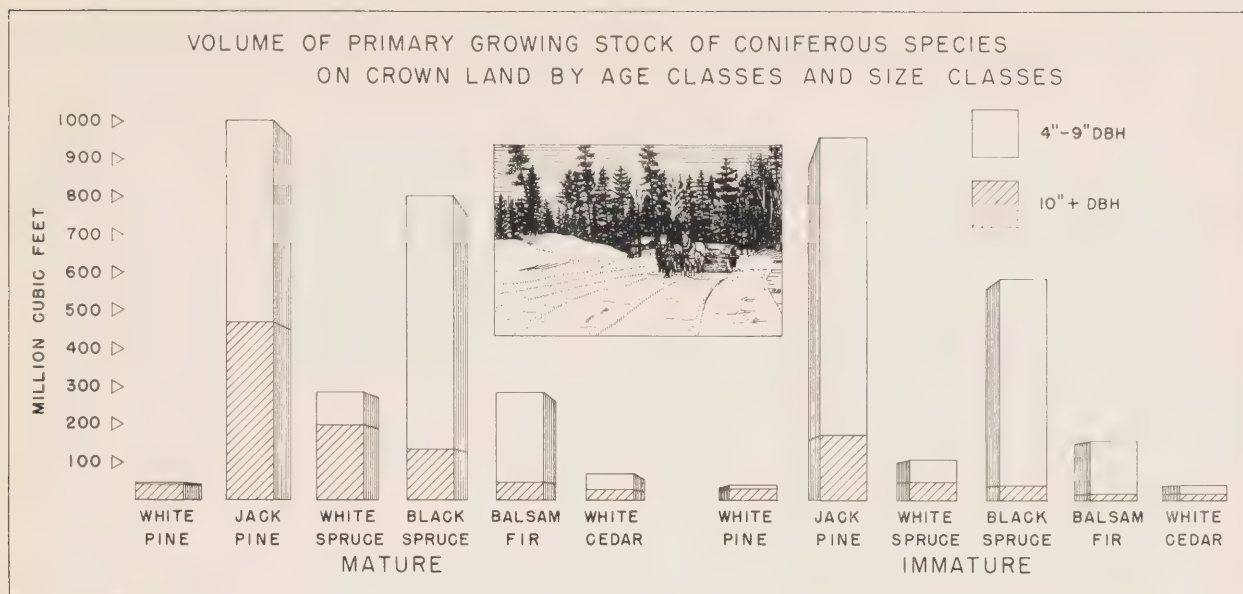


FIGURE 11

The mature age class contains 62 per cent of the total volume on patented lands. Three species, poplar, jack pine and black spruce, form 72 per cent of the mature volume. Mature jack pine produces almost equal amounts of sawlog and pulpwood material, while 77 per cent of the mature black spruce is in the 4-9 inch size class and 63 per cent of the mature poplar is in the sawlog size class (fig. 13).

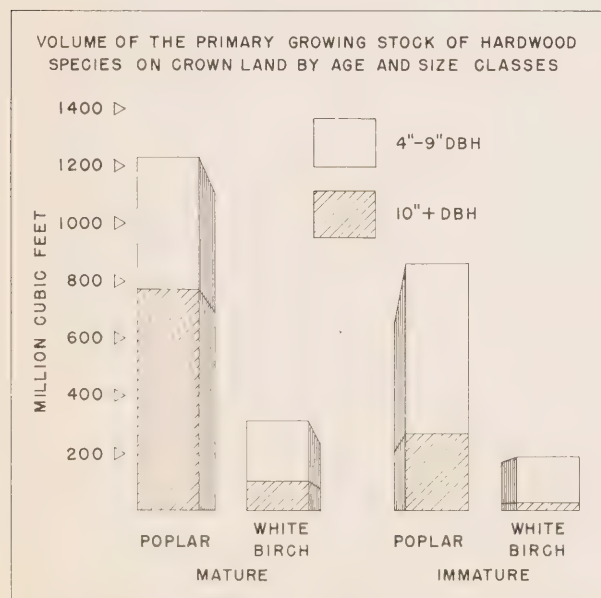


FIGURE 12

### Allowable Cut



The allowable cut has been computed for each species with the aid of a volumetric formula<sup>1</sup> and the appropriate rotation<sup>2</sup> for each species. Thus the amount of the allowable cut results from the volume of the primary growing stock and the rotation adopted for each species encountered in the district. The allowable cut volume, like the volume of the primary growing stock, may appear on areas which, at the moment, are inaccessible to operations or which are economically inoperable due to low net yield. In this respect the assessed allowable cut is regarded as potential, rather than actually available under present operating conditions.

The calculation of allowable cut, based on the present volume of the primary growing stock, is of

<sup>1</sup> Method of calculation of allowable cut is given in Appendix, methods, allowable cut, page 27.

<sup>2</sup> Rotation by species, table 16, page 27.



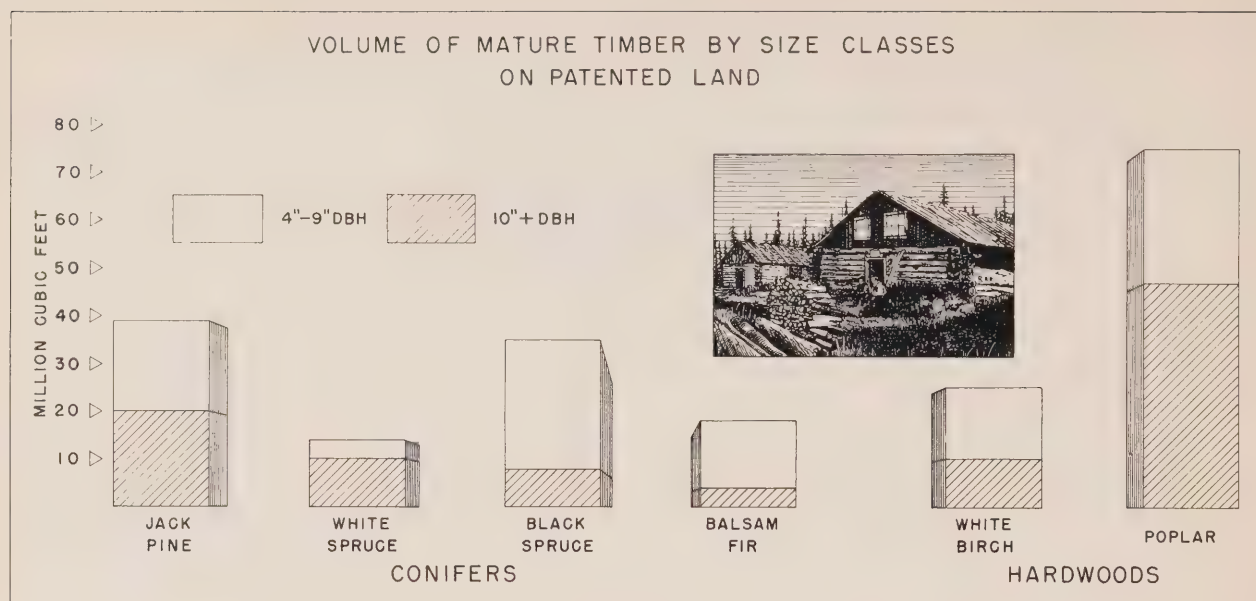


FIGURE 13

value for a period of about ten years. This is because of woods operations being carried out and the present stands growing in volume each year. Therefore, the size and structure of the primary growing stock, regarded as the foundation of the allowable cut calculations, change also from year to year, and for that reason, on expiration of the initial ten year period the allowable cut should be calculated anew. With effective forestry practices allowable cuts for the valuable species can be maintained or increased; without them the present trend toward an increase in the allowable cut for poplar may continue.

The allowable cut, or net depletion, permissible under management in the Kenora district is 142,140,050 cubic feet; 135,402,060 cubic feet from Crown lands and 6,737,990 cubic feet from patented lands. Of the total allowable cut, 95 per cent is on Crown lands and 5 per cent on patented lands.

#### CROWN LANDS

The annual allowable cut for Crown lands represents 1.9 per cent of the primary growing stock or 27.1 cubic feet per acre on the productive forest area. Of the allowable cut, 69,295,665 cubic feet or 51 per cent is coniferous species and 66,106,395 cubic feet or 49 per cent is of hardwood species. Since the rotation is on the average longer for conifers than for hardwoods, the annual allowable cut for conifers is 1.6 per cent of the coniferous primary growing stock and for hardwoods, 2.6 per cent.

The annual allowable cut for species making up the coniferous content (table 11) shows that 55 per cent is jack pine, 31 per cent white and black spruce, 10 per cent balsam fir, 3 per cent white and red pine and one per cent other conifers. The relationship of the allowable cut for a ten-year period to the volume of the coniferous primary growing stock by species is shown graphically, figure 14.

TABLE 11. — *Annual allowable cut for coniferous species on Crown lands in the Kenora district.*

Species	Annual allowable cut cu. ft.
White pine.....	983,775
Red pine.....	1,142,220
Jack pine.....	38,480,155
White spruce.....	5,308,450
Black spruce.....	15,860,640
Balsam fir.....	6,752,175
White cedar.....	746,435
Larch.....	21,815
<b>TOTAL CONIFERS.....</b>	<b>69,295,665</b>

The species making up the hardwood content (table 12) show that 87 per cent is poplar and another 13 per cent is white birch. Ash and red maple appear in inappreciable quantities. The relationship of the allowable cut for a ten-year period to the volume of the primary growing stock for hardwoods is shown graphically, figure 14.

# TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON CROWN LANDS IN THE KENORA DISTRICT

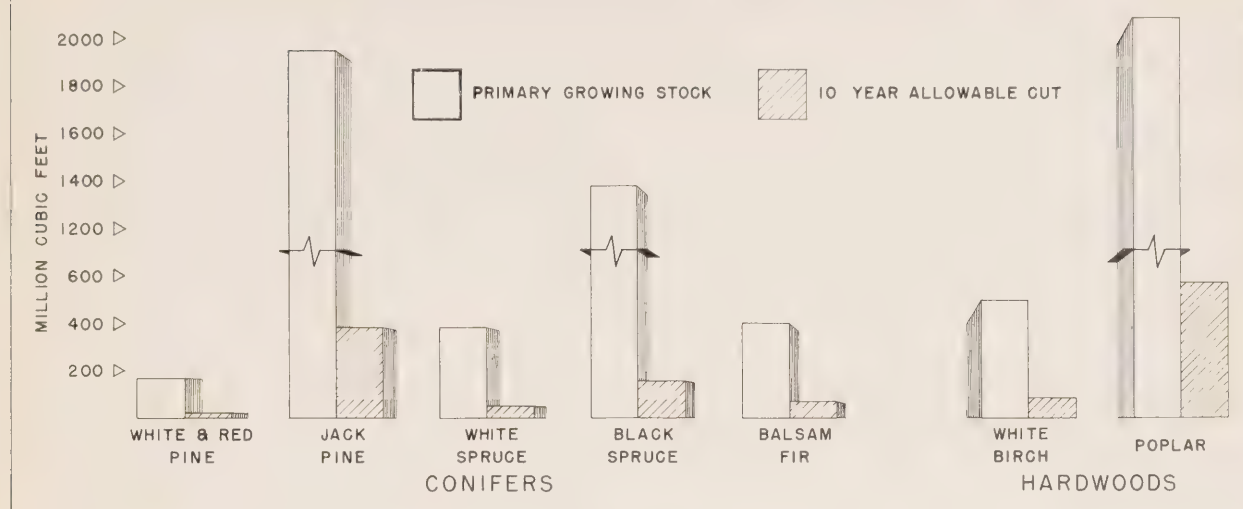


FIGURE 14

TABLE 12. — *Annual allowable cut for hardwood species on Crown lands in the Kenora district.*

Species	Annual allowable cut cu. ft.
White birch.....	8,581,370
Poplar.....	57,418,510
Red maple.....	49,630
Ash.....	56,885
<b>TOTAL HARDWOODS.....</b>	<b>66,106,395</b>

## PATENTED LANDS

The annual allowable cut for patented lands amounts to 6,737,990 cubic feet (table 13), which

TABLE 13. — *Annual allowable cut for all species on patented lands.*

Species	Annual allowable cut cu. ft.
White pine.....	1,255
Red pine.....	4,425
Jack pine.....	1,391,270
White spruce.....	258,895
Black spruce.....	667,285
Balsam fir.....	379,545
White cedar.....	2,910
Larch.....	810
<b>TOTAL CONIFERS.....</b>	<b>2,706,395</b>
White birch.....	605,310
Poplar.....	3,426,040
Red maple.....	35
Ash.....	210
<b>TOTAL HARDWOODS.....</b>	<b>4,031,595</b>
<b>TOTAL.....</b>	<b>6,737,990</b>

represents 2 per cent of the primary growing stock or 30.8 cubic feet per acre on the productive forest land. The annual allowable cut is 1.5 per cent of the coniferous primary growing stock and for hardwoods, 2.5 per cent.

The annual allowable cut for coniferous species on patented lands is 2,706,395 cubic feet and for hardwoods, 4,031,595 cubic feet. Approximately one half of the allowable cut is for poplar alone, which contributes 3,426,040 cubic feet to the total allowable cut. For the coniferous species jack pine is most important, followed by spruce. Balsam fir, white and red pine, cedar and larch are present in inappreciable volumes (fig. 15).

## Utilization vs. Allowable Cut



According to the Classification of Annual Timber Returns for the period 1946-1949<sup>1</sup>, the following

<sup>1</sup> Reports of the Minister of Lands and Forests for the Province of Ontario for the fiscal years ending March 31, 1947-1950.

# TEN-YEAR ALLOWABLE CUT AND PRIMARY GROWING STOCK ON PATENTED LANDS KENORA DISTRICT

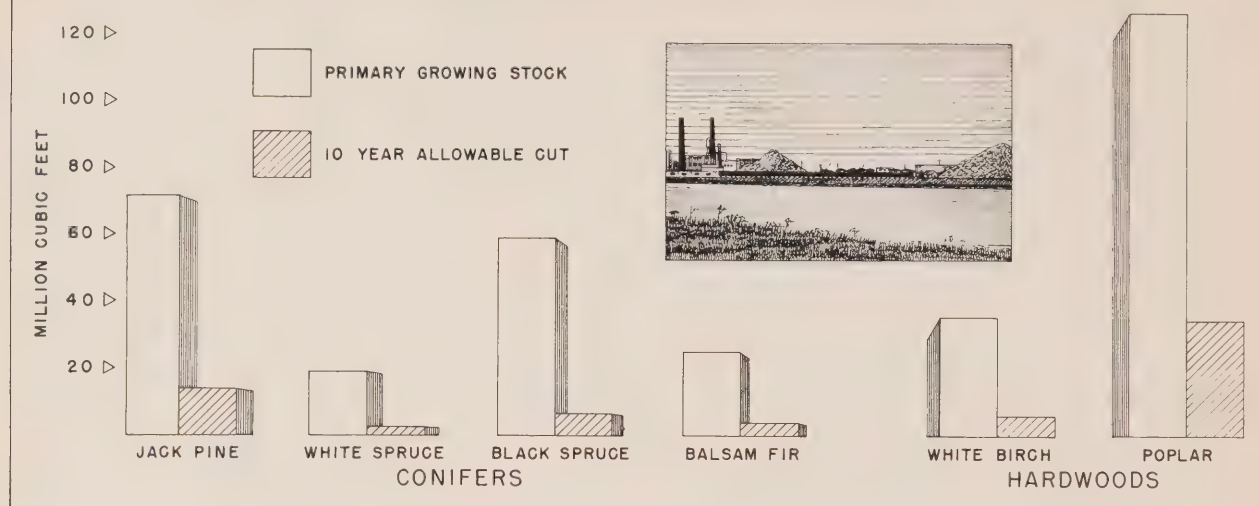


FIGURE 15

average amounts of wood and forest products were cut annually on Crown lands in the Kenora district:

Logs and booms.....	1,980,373 F.B.M. Doyle rule
Poles.....	1,614 pieces
Posts.....	388 pieces
Piling ..	24,451 pieces
Ties.....	20,563 pieces
Pulpwood.....	141,566 cords
Fuelwood.....	4,897 cords

By the use of appropriate converting factors, these amounts are expressed in gross total cubic feet (table 14), and are comparable with the figures for the allowable cut.

TABLE 14. — Gross total cubic volume of wood utilized annually in the Kenora district.

Species	Wood Utilized cu. ft.	Total cu. ft.
Pine, white and red.....	212,940	1
Jack pine.....	8,248,593	47
Spruce, white and black.....	8,032,357	46
Balsam fir.....	513,702	3
<b>TOTAL CONIFERS.....</b>	<b>17,007,592</b>	<b>97</b>
White birch.....	65	...
Poplar.....	440,527	3
<b>TOTAL HARDWOODS.....</b>	<b>440,592</b>	<b>3</b>
<b>TOTAL.....</b>	<b>17,448,184</b>	<b>100</b>

Jack pine, which forms 28 per cent of the primary growing stock, contributed 8,248,593 cubic feet or

formed 47 per cent of the actual cut. Black and white spruce, which form 25 per cent of the primary growing stock, contributed 8,032,357 cubic feet or formed 46 per cent of the actual cut. The three species, jack pine, white and black spruce, comprise 93 per cent of the actual cut for the district, the balance of 7 per cent being made up of 3 per cent balsam fir, 3 per cent poplar and one per cent red and white pine.

A comparison of the annual allowable cut with the actual cut on Crown lands, by species (table 15),

TABLE 15. — Comparison of allowable cut with actual utilization by species.

Species	Allowable Cut Thousand cu. ft.	Actual Cut Thousand cu. ft.
Pine, white and red.....	2,126	213
Jack pine.....	38,480	8,249
Spruce, white and black.....	21,169	8,032
Balsam fir.....	6,752	514
White cedar .....	747	...
Larch .....	22	...
<b>TOTAL CONIFERS.....</b>	<b>69,296</b>	<b>17,008</b>
White birch.....	8,581	*
Poplar.....	57,418	440
Red maple .....	50	...
Ash, white and black .....	57	...
<b>TOTAL HARDWOODS.....</b>	<b>66,106</b>	<b>440</b>
<b>TOTAL.....</b>	<b>135,402</b>	<b>17,448</b>

\* Less than 500 cubic feet



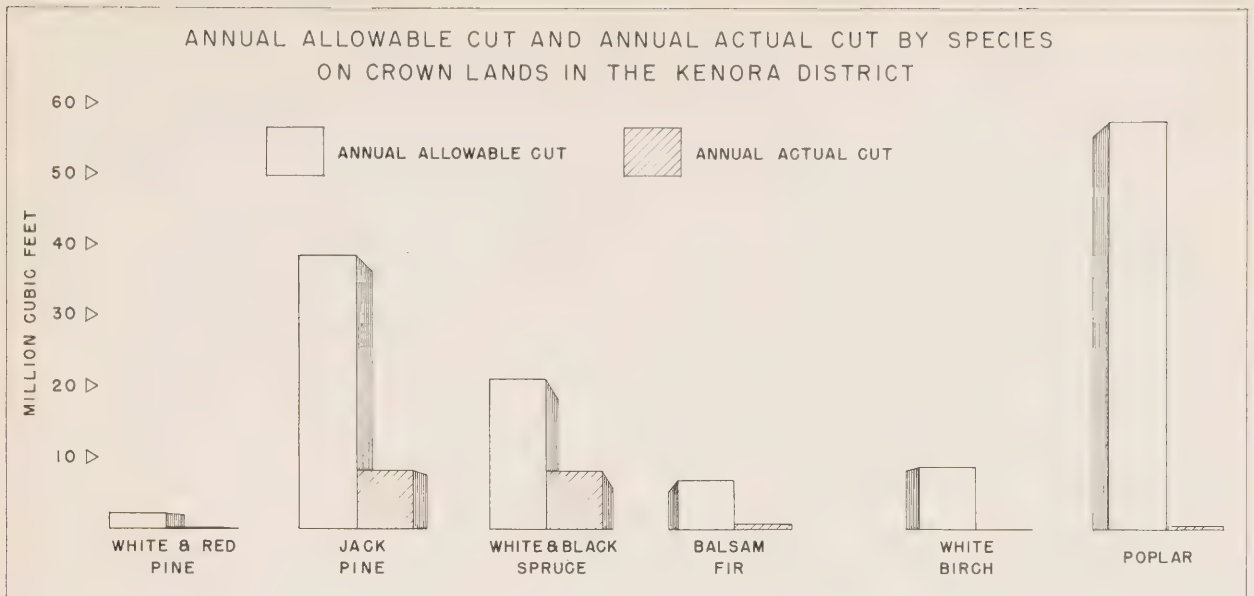


FIGURE 16

shows that the actual cut was less than the allowable cut for all species in the district (fig. 16). For the district as a whole only 25 per cent of the allowable cut for conifers was utilized; spruce, with 38 per cent of the allowable cut actually utilized, and jack pine, with 21 per cent, show a large surplus of allowable cut over actual cut. Because of the scattered nature of the occurrence of the remaining

white and red pine stands of the district, only 10 per cent of the allowable cut was actually utilized; balsam fir was utilized to a minor extent; less than one per cent of the hardwood allowable cut was taken, leaving large quantities of poplar and white birch unutilized in the district.

There are no available records of the amount of wood cut on patented lands in the district.



*Larch sawfly larvae feeding on needles of a larch tree.*

# APPENDIX

## *Survey Methods*



● The forest resources inventory for the Province of Ontario was carried out by the Aerial Photographic Method. Photographs were taken from a height of 7,920 feet above mean ground level, with a six-inch focal length camera, to produce photographs on a scale of four inches to the mile (1/15,840). Following the photography, planimetric base maps were prepared by the Slotted Templet Method. Forest type maps were prepared by direct photographic interpretation on stereoscopic pairs of photographs, and were transferred to base maps.

Photography in the Kenora district was carried out during the years of 1948, 1949 and 1951. Data

necessary for the making of volume estimates was collected during the summers of 1950, 1951, 1952 and 1953. On completion of the field work, finished forest type maps were prepared and areas determined by the usual methods.<sup>1</sup>

Volume estimates were prepared for type aggregates. For this purpose types were classified into three cover types: coniferous, hardwood and mixed-woods. These were separated into two age classes, mature and immature. The volume per acre for each cover type for the mature and immature age classes was then summarized from the field tallies into four density classes. These summaries were made separately for the four ecological sections in the Kenora district. The per-acre volumes in cubic feet, made up in this manner, are shown in tables 18, 19, 20 and 21. Additional tables covering the Quetico section may be seen in Report No. 14 of the Fort Frances district and tables for the Northern Coniferous section are contained in Report No. 16 of the Sioux Lookout district.

<sup>1</sup> A complete statement of the methods used in the forest resources inventory is contained in the Manual of Timber Management, Department of Lands and Forests, Ontario, Part II and Part III.

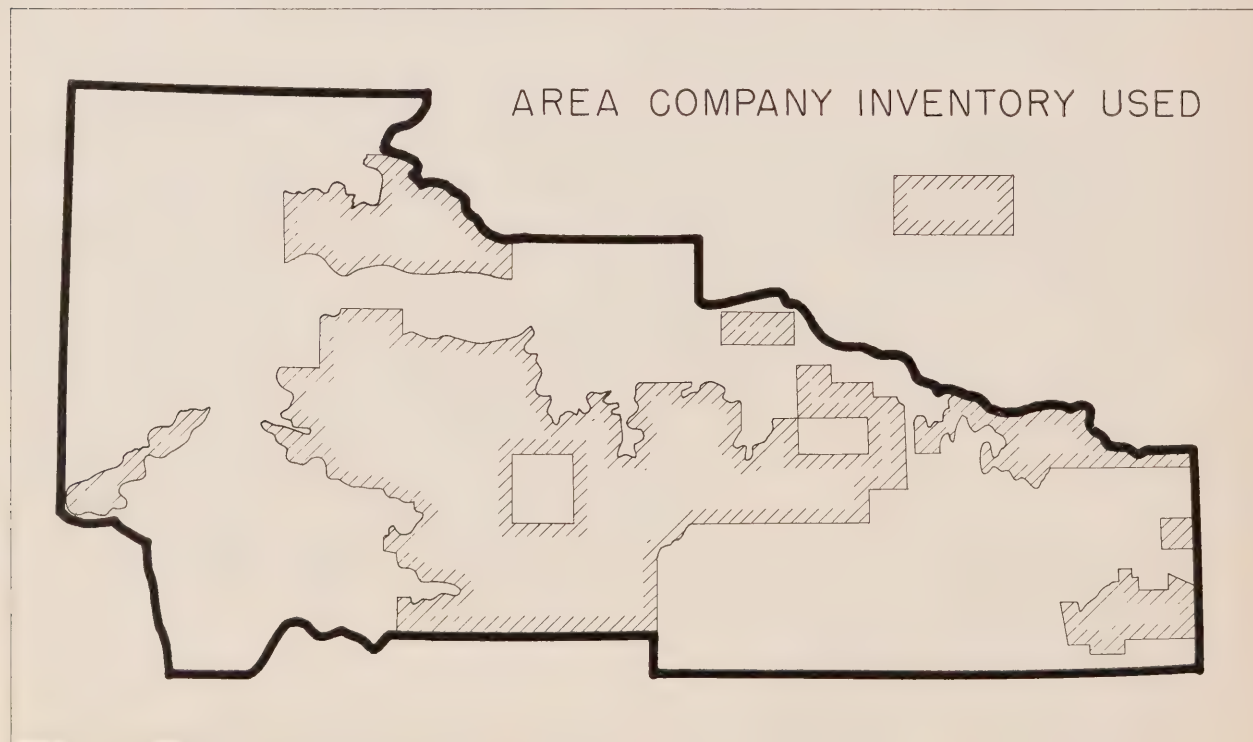


FIGURE 17

The holder of a licence to cut timber on Crown lands in Ontario is required by Statute to supply a complete inventory of the timber resources on the licensed area. The forest resources inventory of the Kenora district is therefore made up of a combination of surveys carried out by the Department of Lands and Forests and company surveys. The areas surveyed by licensees in the Kenora district are shown in figure 17.

### *Mean Annual Increment*

The mean annual increment to the rotation age was calculated by taking the total mature volume for each species and dividing by the rotation age for the species. The results were totalled and the sum divided by the area of the mature age class.

The mean annual increment to the rotation age for Crown lands amounts to 27 cubic feet per acre, and for patented lands, 31 cubic feet per acre. These figures should be regarded as approximate, since no age class other than the mature was considered in the calculation.

### *Age Classes*

The age classes in their present form do not permit of the usual method of arriving at sustained yield because there are no figures for areas by species. The immature age class may have an age range from 10 to 100 years, the mature age class from 30 to 200 years, depending on the species. Therefore, no normal area for each age class can be arrived at.

### *Rotation*

In view of the absence of local studies on maturity of stands, the mature age figures shown in Class 1b<sup>1</sup> were used as rotation ages for each species encountered except jack pine where a rotation of 70 years has been accepted as more suitable than 60 years (table 16).

### *Allowable Cut.*

#### (a) METHOD

The following two bases were available for the calculation of the allowable cut: 1. the volumes of the mature and immature age classes for each species and 2. the adopted rotations.

The compilation was carried out in such a way that volumes were shown by species. This suggests the calculation of the allowable cut by individual

TABLE 16. — *Rotation by species.*

Species	Crown and patented lands years
White pine...	120
Red pine	100
Jack pine	70
White spruce.....	100
Black spruce .	120
Balsam fir.....	90
White cedar..	200
Larch..	100
White birch	80
Poplar.....	50
Red maple.....	70
White and black ash.	100

species, separately, rather than for the total primary growing stock in the district, and the method of calculation most suitable to the available data is by a volumetric formula.

In view of this, the "French Method of 1883"<sup>1</sup> was considered and found to be satisfactory for the following reasons: 1. The ratio of the volume per acre of mature to immature age class has been actually found, so far in Ontario, to be approximately 5/3 as required by the French method. 2. In compilation, three age classes were used, the same number which the proposed French method requires, although the division into thirds is not exactly the same. 3. The French method is recognized as sound enough, although not entirely free from those disadvantages normally connected with the volumetric methods of regulating yield. The method tends toward building up a normal growing stock, and the results of calculations may be considered rather conservative.

#### (b) FORMULA

In the present calculations the following formula was used:

$$P = \frac{5/8 (V.1. + V.2.)}{n/3}$$

where:

- V.1. — denotes volume of mature timber (Age Class I).
- V.2. — denotes volume of immature timber (Age Class II).
- n — denotes rotation.
- P — denotes annual allowable cut.

By application of this formula, the following figures for the annual allowable cut were obtained:

Crown lands .....	184,531,435 cu. ft.
Patented lands.....	9,300,690 cu. ft.
<b>TOTAL.....</b>	<b>193,832,125 cu. ft.</b>

<sup>1</sup> Manual of Timber Management, Department of Lands and Forests, Ontario — Part II, page 50.

<sup>1</sup> "Le traité pratique d'aménagement des forêts" — L. Pardé, 1930, Paris.



This may be regarded as the maximum annual allowable cut for the district, fully justified if need of intensive utilization was substantiated by the present operations in the district. As may be seen from table 14, the actually utilized annual volume was only 17,448,184 cubic feet on Crown lands, or 9 per cent of the maximum annual allowable cut of 184,531,435 cubic feet on Crown lands in the Kenora district.

With rather a moderate demand on wood in view, and with a substantial accumulation of mature timber in the district, an advantageous opportunity arises where, by means of a normal and not the maximum utilization, the normal size of age classes may be obtained. In this way a sound foundation would be created for a balanced sustained yield in the future.

In view of the foregoing, the calculations of the annual allowable cut, carried out on the French method principles, were brought down to the normal level, according to the following procedure:

#### (a) CROWN LANDS

Productive forest area = 4,990,219 acres  
 Age Class I volume per acre = 1953.60 cubic feet  
 Mean annual increment to the rotation age = 27.20 cu. ft.  

$$\text{Average rotation} = \frac{1953.60}{27.20} = 72 \text{ years}$$
  
 Thus the normal area allotment =  $\frac{4,990,219}{72} = 69,309 \text{ acres}$   
 Annual allowable cut =  $69,309 \times 1953.60 = 135,402,060 \text{ cu. ft.}$

#### Common and Botanical Names of Tree Species included in Timber Estimates.

##### CONIFERS

White pine.....*Pinus strobus* L.  
 Red pine.....*Pinus resinosa* Ait.  
 Jack pine.....*Pinus banksiana* Lamb.  
 White spruce.....*Picea glauca* (Moench) Voss.  
 Black spruce.....*Picea mariana* (Mill.) BSP.  
 Balsam fir.....*Abies balsamea* (L.) Mill.  
 White cedar.....*Thuja occidentalis* L.  
 Larch.....*Larix laricina* (Du Roi) Koch.

##### HARDWOODS

Red maple.....*Acer rubrum* L.  
 White ash.....*Fraxinus americana* L.  
 Black ash.....*Fraxinus nigra* Marsh.  
 White birch.....*Betula papyrifera* Marsh.  
 Poplar.....*Populus tremuloides* Michx.  
                                   *Populus tacamahacca* Mill.  
                                   *Populus grandidentata* Michx

#### (b) PATENTED LAND

Productive forest area = 218,588 acres  
 Age Class I volume per acre = 2126.89 cubic feet  
 Mean annual increment to the rotation age = 30.87 cubic feet  

$$\text{Average rotation} = \frac{2126.89}{30.87} = 69 \text{ years}$$
  
 Thus the normal area allotment =  $\frac{218,588}{69} = 3,168 \text{ acres}$   
 Annual allowable cut =  $3,168 \times 2126.89 = 6,737,990 \text{ cu. ft.}$

#### Cull Factor

Where it was found necessary either to calculate net merchantable volume or to calculate the volume of the primary growing stock, when merchantable volumes only were given in company reports, the appropriate cull factors (table 17) were used throughout. These cull factors were taken from the figures for defect, made available from operations being carried out in the district.

TABLE 17. — Cull factors by species, Kenora district.

Species	Cull per cent
White pine.....	15
Red pine.....	15
Jack pine.....	16
White spruce.....	5
Black spruce.....	5
Balsam fir.....	20
White birch.....	22
Poplar.....	40

#### FOREST INSECTS

The photographs for the Kenora district report contained herein, are the work of D. C. Anderson and were supplied by the Forest Insect Laboratory at Sault Ste. Marie, Ontario.

In recent years insect epidemics have been especially prevalent in the forests of Ontario. The spruce budworm, *Choristoneura fumiferana* (Clem.), epidemic has subsided in many sections of the province but is still active in the Kenora and Sioux Lookout districts. The jack pine sawfly, *Neodiprion americanus banksianae* (Roh.), is periodically active in many parts of the province. The larch saw-fly, *Pristiphora erichsonii* (Htg.), which killed practically all of the larch in eastern Canada in the early part of the present century is again active in the larch stands which have now reached polewood size. The forest tent caterpillar, *Malacosoma disstria* (Hbn.), appears in cycles of from 10 to 12 years feeding on poplar and other broad-leaved species.

TABLE 18. — *Volume of the primary growing stock in cubic feet per acre.**Quetico Section — 1950*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	8.9 225.4	8.7 220.6	7.5 189.1	12.4 269.7	22.5 64.5	21.8 62.4	19.0 54.5	2.5 167.3
Red pine.....	4"-9" 10" up	23.7 177.5	23.2 173.7	19.9 148.9	1.9 35.0	41.8 69.5	40.5 67.2	35.3 58.6	3.8 11.4
Jack pine.....	4"-9" 10" up	544.3 265.6	532.6 259.9	456.7 222.9	116.0 76.7	552.3 135.5	534.6 131.1	466.3 114.4	24.1 24.4
White spruce.....	4"-9" 10" up	16.9 44.2	16.5 43.3	14.2 37.1	7.2 26.9	22.8 29.8	22.0 28.9	19.2 25.2	11.8 48.8
Black spruce.....	4"-9" 10" up	496.4 94.5	485.6 92.5	416.5 79.3	59.9 13.9	526.1 56.5	509.2 54.7	444.2 47.7	26.8 23.2
Balsam fir.....	4"-9" 10" up	116.8 33.5	114.2 32.8	98.0 28.1	67.5 39.5	111.7 13.7	108.2 13.2	94.4 11.5	81.1 ...
White cedar.....	4"-9" 10" up	63.3 87.0	61.9 85.1	53.1 73.0	13.4 49.3	32.3 26.4	31.2 25.6	27.2 22.3	30.3 79.6
TOTAL CONIFERS.....	4"-9" 10" up	1270.3 927.7	1242.7 907.9	1065.9 778.4	278.3 511.0	1309.5 395.9	1267.5 383.1	1105.6 334.2	180.4 354.7
White birch.....	4"-9" 10" up	64.2 63.2	62.8 61.8	53.8 53.0	16.7 39.5	50.0 20.8	48.4 20.1	42.2 17.6	33.3 23.6
Poplar (all).....	4"-9" 10" up	90.9 130.7	88.9 127.9	76.2 109.7	34.5 41.1	130.6 116.2	126.4 112.5	110.2 98.2	0.3 165.7
Red maple.....	4"-9" 10" up	..... .....	..... .....	..... .....	0.9 .....	..... .....	..... .....	..... .....	..... .....
TOTAL HARDWOODS.....	4"-9" 10" up	155.1 193.9	151.7 189.7	130.0 162.7	52.1 80.6	180.6 137.0	174.8 132.6	152.4 115.8	33.6 189.3
GRAND TOTAL.....	4"-9" 10" up	1425.4 1121.6	1394.4 1097.6	1195.9 941.1	330.4 591.6	1490.1 532.9	1442.3 515.7	1258.0 450.0	214.0 544.0
TOTAL 4" UP.....		2547.0	2492.0	2137.0	922.0	2023.0	1958.0	1708.0	758.0

SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	9.0 24.0	8.5 22.6	6.9 18.3	..... 284.1	1.2 29.1	1.1 26.6	0.8 19.4	..... .....
Jack pine.....	4"-9" 10" up	15.8 44.6	14.9 42.0	12.1 34.2	1.1 3.3	86.1 42.4	78.9 38.8	57.6 28.4	29.0 19.0
White spruce.....	4"-9" 10" up	13.1 28.1	12.4 26.4	10.0 21.5	10.6 35.5	5.7 15.1	5.2 13.8	3.8 10.1	2.2 4.9
Black spruce.....	4"-9" 10" up	18.9 3.1	17.7 3.0	14.4 2.4	1.1 .....	17.0 3.8	15.6 3.4	11.4 2.5	1.0 .....
Balsam fir.....	4"-9" 10" up	35.0 22.7	32.9 21.4	26.8 17.4	5.8 13.9	37.0 14.0	33.9 12.8	24.8 9.4	4.6 .....
White cedar.....	4"-9" 10" up	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	..... .....	7.1 .....
TOTAL CONIFERS.....	4"-9" 10" up	91.8 122.5	86.4 115.4	70.2 93.8	18.6 336.8	147.0 104.4	134.7 95.4	98.4 69.8	36.8 31.0
White birch.....	4"-9" 10" up	390.9 166.7	368.2 157.0	299.1 127.6	44.5 117.9	236.0 13.5	216.1 12.3	158.0 9.0	22.4 .....
Poplar (all).....	4"-9" 10" up	766.2 1154.0	721.5 1086.8	586.3 883.0	153.5 425.7	1232.5 141.5	1128.2 129.5	824.9 94.7	382.9 33.8
Red maple.....	4"-9" 10" up	10.4 3.3	9.8 3.1	7.9 2.6	..... .....	1.9 .....	1.7 .....	1.3 .....	..... .....
Ash.....	4"-9" 10" up	19.7 21.5	18.5 20.3	15.1 16.4	..... .....	7.4 5.8	6.8 5.3	5.0 3.9	3.1 .....
TOTAL HARDWOODS.....	4"-9" 10" up	1187.2 1345.5	1118.0 1267.2	908.4 1029.6	198.0 543.6	1477.8 160.8	1352.8 147.1	989.2 107.6	408.4 33.8
GRAND TOTAL.....	4"-9" 10" up	1279.0 1468.0	1204.4 1382.6	987.6 1123.4	216.6 880.4	1624.8 265.2	1487.5 242.5	1087.6 177.4	445.2 64.8
TOTAL 4" UP.....		2747.0	2587.0	2102.0	1097.0	1890.0	1730.0	1265.0	510.0

(Continued on page 30)

TABLE 18 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	15.8 206.4	14.9 194.4	12.0 157.6	..... 267.9	21.9 69.5	20.5 65.1	16.2 51.4	4.7 29.5
Red pine.....	4"-9" 10" up	9.6 64.5	9.1 60.7	7.3 49.2	.....	22.5 42.5	21.0 39.8	16.6 31.4	11.7 43.0
Jack pine.....	4"-9" 10" up	184.0 249.0	173.4 234.6	140.4 190.0	6.3 60.1	305.7 143.2	286.1 134.0	225.9 105.8	124.7 47.8
White spruce.....	4"-9" 10" up	39.2 106.1	37.0 99.9	29.9 81.0	11.2 56.3	30.8 42.3	28.9 39.5	22.8 31.2	5.3 12.7
Black spruce.....	4"-9" 10" up	164.1 52.4	154.6 49.4	125.2 40.0	70.2 34.4	212.5 23.1	198.9 21.6	157.0 17.1	27.9 8.8
Balsam fir.....	4"-9" 10" up	188.7 44.9	177.8 42.3	144.1 34.2	67.9 21.4	121.7 18.4	114.0 17.2	90.0 13.6	42.3 11.2
White cedar.....	4"-9" 10" up	32.9 29.8	30.9 28.1	25.0 22.8	9.0 8.4	19.2 15.3	18.0 14.3	14.2 11.3	.....
TOTAL CONIFERS.....	4"-9" 10" up	634.3 753.1	597.7 709.4	483.9 574.8	164.6 448.5	734.3 354.3	687.4 331.5	542.7 261.8	216.6 153.0
White birch.....	4"-9" 10" up	232.1 183.9	218.7 173.2	177.1 140.3	83.1 178.3	174.9 36.3	163.7 34.0	129.3 26.8	29.5 6.6
Poplar (all).....	4"-9" 10" up	359.9 674.3	339.1 635.2	274.6 514.6	51.7 155.2	454.4 264.6	425.3 247.7	335.8 195.6	128.8 58.7
Red maple.....	4"-9" 10" up	9.7 1.7	9.1 1.6	7.4 1.3	6.1 1.5	10.9 1.3	10.2 1.2	8.0 1.0	2.4 .....
Ash.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	3.8 1.6
TOTAL HARDWOODS.....	4"-9" 10" up	601.7 859.9	566.9 810.0	459.1 656.2	140.9 335.0	640.2 302.2	599.2 282.9	473.1 223.4	164.5 66.9
GRAND TOTAL.....	4"-9" 10" up	1236.0 1613.0	1164.6 1519.4	943.0 1231.0	305.5 783.5	1374.5 656.5	1286.6 614.4	1015.8 485.2	381.1 219.9
TOTAL 4" UP.....		2849.0	2684.0	2174.0	1089.0	2031.0	1901.0	1501.0	601.0

*Jack pine sawfly larvae feeding on jack pine needles.*



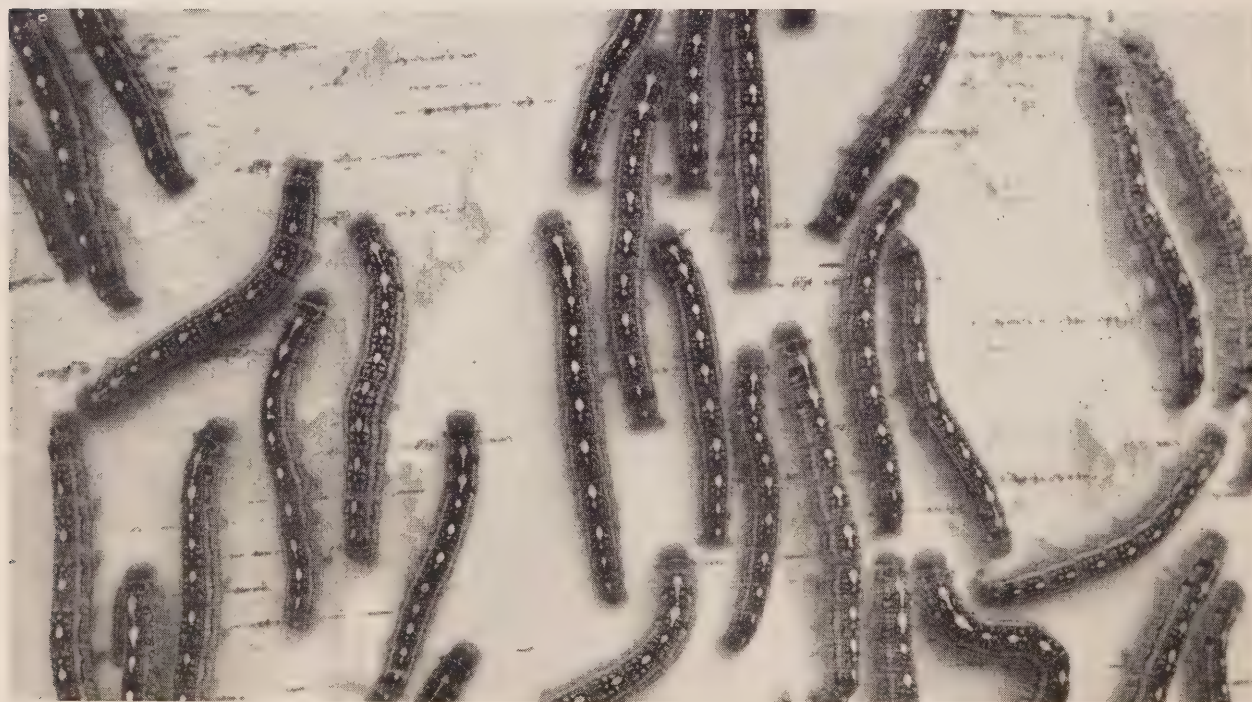
TABLE 19. — *Volume of the primary growing stock in cubic feet per acre.**Western Transition Section — 1950*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	525.0	495.3	386.6	208.2	896.1	817.7	573.5	215.0
	10'' up	364.8	344.2	268.7	134.3	111.9	102.1	71.6	26.9
White spruce.....	4''-9''	21.0	19.8	15.4	13.2	14.9	13.6	9.5	3.5
	10'' up	58.7	55.4	43.3	41.2	9.1	8.3	5.9	2.2
Black spruce.....	4''-9''	978.9	923.7	720.9	116.9	679.3	619.9	434.8	163.0
	10'' up	197.7	186.5	145.6	.....	52.7	48.1	33.7	12.7
Balsam fir.....	4''-9''	164.8	155.5	121.3	59.1	49.4	45.1	31.6	11.8
	10'' up	50.3	47.5	37.1	7.0	8.6	7.8	5.5	2.1
White cedar.....	4''-9''	6.8	6.4	5.0	32.5	.....	.....	.....	.....
	10'' up	3.8	3.6	2.8	107.0	.....	.....	.....	.....
Larch.....	4''-9''	.....	.....	.....	.....	3.3	3.0	2.1	0.8
	10'' up	.....	.....	.....	.....	0.7	0.6	0.4	0.2
TOTAL CONIFERS.....	4''-9''	1696.5	1600.7	1249.2	429.9	1643.0	1499.3	1051.5	394.1
	10'' up	675.3	637.2	497.5	289.5	183.0	166.9	117.1	44.1
White birch.....	4''-9''	80.9	76.3	59.6	45.5	52.8	48.2	33.8	12.7
	10'' up	67.8	64.0	49.9	32.4	9.2	8.4	5.9	2.2
Poplar (all).....	4''-9''	44.6	42.0	32.8	30.1	81.4	74.3	52.1	19.6
	10'' up	90.9	85.8	67.0	78.6	30.6	27.9	19.6	7.3
TOTAL HARDWOODS.....	4''-9''	125.5	118.3	92.4	75.6	134.2	122.5	85.9	32.3
	10'' up	158.7	149.8	116.9	111.0	39.8	36.3	25.5	9.5
GRAND TOTAL.....	4''-9''	1822.0	1719.0	1341.6	505.5	1777.2	1621.8	1137.4	426.4
	10'' up	834.0	787.0	614.4	400.5	222.8	203.2	142.6	53.6
TOTAL 4'' UP.....		2656.0	2506.0	1956.0	906.0	2000.0	1825.0	1280.0	480.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4''-9''	39.9	36.4	25.8	14.3	71.2	60.8	38.9	30.0
	10'' up	65.0	59.5	42.2	21.6	32.3	27.6	17.6	68.2
White spruce.....	4''-9''	12.8	11.7	8.3	1.5	7.0	6.0	3.9	.....
	10'' up	26.2	23.9	17.0	.....	4.5	3.8	2.4	.....
Black spruce.....	4''-9''	41.7	38.1	27.0	.....	37.5	32.0	20.5	1.7
	10'' up	6.3	5.7	4.1	.....	2.8	2.4	1.5	.....
Balsam fir.....	4''-9''	23.4	21.3	15.2	14.2	36.9	31.5	20.1	.....
	10'' up	18.6	17.0	12.0	.....	1.4	1.2	0.8	.....
TOTAL CONIFERS.....	4''-9''	117.8	107.5	76.3	30.0	152.6	130.3	83.4	31.7
	10'' up	116.1	106.1	75.3	21.6	41.0	35.0	22.3	68.2
White birch.....	4''-9''	369.5	337.6	239.4	81.5	322.4	275.3	176.1	215.9
	10'' up	119.2	108.9	77.3	.....	13.1	11.2	7.1	.....
Poplar (all).....	4''-9''	1114.9	1018.7	722.6	177.7	1215.8	1038.2	664.1	31.2
	10'' up	1160.5	1060.2	752.1	437.2	172.1	147.0	94.0	.....
TOTAL HARDWOODS.....	4''-9''	1484.4	1356.3	962.0	259.2	1538.2	1313.5	840.2	247.1
	10'' up	1279.7	1169.1	829.4	437.2	185.2	158.2	101.1	.....
GRAND TOTAL.....	4''-9''	1602.2	1463.8	1038.3	289.2	1690.8	1443.8	923.6	278.8
	10'' up	1395.8	1275.2	904.7	458.8	226.2	193.2	123.4	68.2
TOTAL 4'' UP.....		2998.0	2739.0	1943.0	748.0	1917.0	1637.0	1047.0	347.0

*(Continued on page 32)*

TABLE 19 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	214.3 299.7	198.7 277.7	144.4 202.0	.....	456.6 137.1	420.3 126.2	301.9 90.7	98.6 58.7
White spruce.....	4"-9" 10" up	67.8 139.6	62.8 129.4	45.7 94.1	..... 110.4	42.7 14.5	39.3 13.3	28.2 9.6	40.4 .....
Black spruce.....	4"-9" 10" up	288.7 123.1	267.6 114.1	194.6 83.0	..... 59.6	337.0 34.6	310.3 31.8	222.9 22.9	54.0 64.6
Balsam fir.....	4"-9" 10" up	251.1 103.6	232.8 96.0	169.3 69.8	158.0 69.3	92.8 15.0	85.4 13.8	61.3 9.9	22.2 .....
White cedar.....	4"-9" 10" up	.....	.....	.....	78.2 .....	.....	.....	.....	2.2 .....
Larch.....	4"-9" 10" up	.....	.....	.....	.....	4.4 4.0	.....	2.9 .....	..... .....
TOTAL CONIFERS.....	4"-9" 10" up	821.9 666.0	761.9 617.2	554.0 448.9	236.2 239.3	933.5 201.2	859.3 185.1	617.2 133.1	217.4 123.3
White birch.....	4"-9" 10" up	320.3 256.9	296.9 238.0	215.9 173.1	223.2 42.8	283.0 44.6	260.6 41.0	187.1 29.5	57.7 24.8
Poplar (all).....	4"-9" 10" up	362.2 578.7	335.7 536.3	244.1 390.0	..... 64.5	544.4 192.3	501.0 177.0	360.0 127.1	89.1 10.1
Ash.....	4"-9" 10" up	.....	.....	.....	.....	.....	.....	.....	16.9 14.7
TOTAL HARDWOODS.....	4"-9" 10" up	682.5 835.6	632.6 774.3	460.0 563.1	223.2 107.3	827.4 236.9	761.6 218.0	547.1 156.6	163.7 49.6
GRAND TOTAL.....	4"-9" 10" up	1504.4 1501.6	1394.5 1391.5	1014.0 1012.0	459.4 346.6	1760.9 438.1	1620.9 403.1	1164.3 289.7	381.1 172.9
TOTAL 4" UP.....		3006.0	2786.0	2026.0	806.0	2199.0	2024.0	1454.0	554.0



Nearly full-grown forest tent caterpillar larvae on trunk of white birch tree.

TABLE 20. — *Volume of the primary growing stock in cubic feet per acre.**Western Transition Section — 1951-52*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	523.4 291.8	472.8 263.7	348.5 194.3	14.5 56.0	656.0 86.9	566.1 75.0	369.7 49.0	134.2 17.8
White spruce.....	4"-9" 10" up	22.2 16.6	20.1 14.9	14.8 11.0	.....	11.0 2.7	9.5 2.3	6.2 1.5	2.2 0.6
Black spruce.....	4"-9" 10" up	1087.0 207.0	982.0 187.0	723.7 137.8	368.7 205.6	938.6 35.0	809.9 30.2	529.0 19.8	192.0 7.2
Balsam fir.....	4"-9" 10" up	144.8 39.0	130.8 35.2	96.4 25.9	.....	48.9 5.8	42.2 5.0	27.6 3.3	10.0 1.2
TOTAL CONIFERS.....	4"-9" 10" up	1777.4 554.4	1605.7 500.8	1183.4 369.0	383.2 261.6	1654.5 130.4	1427.7 112.5	932.5 73.6	338.4 26.8
White birch.....	4"-9" 10" up	49.6 17.7	44.8 16.0	33.0 11.8	13.5 .....	43.9 3.0	37.9 2.6	24.8 1.7	9.0 0.6
Poplar (all).....	4"-9" 10" up	78.8 110.1	71.2 99.5	52.5 73.3	19.7 .....	79.6 43.6	68.7 37.6	44.8 24.6	16.3 8.9
TOTAL HARDWOODS.....	4"-9" 10" up	128.4 127.8	116.0 115.5	85.5 85.1	33.2 .....	123.5 46.6	106.6 40.2	69.6 26.3	25.3 9.5
GRAND TOTAL.....	4"-9" 10" up	1905.8 682.2	1721.7 616.3	1268.9 454.1	416.4 261.6	1778.0 177.0	1534.3 152.7	1002.1 99.9	363.7 36.3
TOTAL 4" UP.....		2588.0	2338.0	1723.0	678.0	1955.0	1687.0	1102.0	400.0
		HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	70.0 122.8	66.5 116.8	53.1 93.1	22.7 39.7	59.6 33.6	56.2 31.6	44.9 25.2	18.6 10.4
White spruce.....	4"-9" 10" up	7.2 12.3	6.9 11.6	5.5 9.3	2.3 4.0	5.2 3.7	4.8 3.5	3.9 2.8	1.6 1.2
Black spruce.....	4"-9" 10" up	9.8 .....	9.3 .....	7.4 .....	3.2 .....	40.0 4.4	37.7 4.1	30.1 3.3	12.4 1.4
Balsam fir.....	4"-9" 10" up	33.2 103.4	31.6 98.3	25.2 78.4	10.7 33.5	10.4 .....	9.8 .....	7.8 .....	3.2 .....
TOTAL CONIFERS.....	4"-9" 10" up	120.2 238.5	114.3 226.7	91.2 180.8	38.9 77.2	115.2 41.7	108.5 39.2	86.7 31.3	35.8 13.0
White birch.....	4"-9" 10" up	153.3 285.9	145.7 271.9	116.2 216.8	49.6 92.6	105.1 .....	98.9 .....	79.0 .....	32.6 .....
Poplar (all).....	4"-9" 10" up	936.0 706.1	890.0 671.4	709.6 535.4	303.1 228.6	1110.8 107.2	1045.5 100.9	835.4 80.6	345.3 33.3
TOTAL HARDWOODS.....	4"-9" 10" up	1089.3 992.0	1035.7 943.3	825.8 752.2	352.7 321.2	1215.9 107.2	1144.4 100.9	914.4 80.6	377.9 33.3
GRAND TOTAL.....	4"-9" 10" up	1209.5 1230.5	1150.0 1170.0	917.0 933.0	391.6 398.4	1331.1 148.9	1252.9 140.1	1001.1 111.9	413.7 46.3
TOTAL 4" UP.....		2440.0	2320.0	1850.0	790.0	1480.0	1393.0	1113.0	460.0

*(Continued on page 34)*



TABLE 20 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>	<i>cu. ft.</i>
Jack pine.....	4"-9" 10" up	310.2 241.8	281.1 219.0	214.6 167.2	89.8 70.0	503.5 101.7	441.0 89.0	309.8 62.5	117.2 23.7
White spruce.....	4"-9" 10" up	67.1 111.8	60.8 101.3	46.4 77.4	19.4 32.4	60.5 14.1	53.0 12.3	37.2 8.7	14.1 3.3
Black spruce.....	4"-9" 10" up	324.0 109.7	293.6 99.4	224.1 75.9	93.8 31.8	280.0 33.2	245.2 29.1	172.3 20.4	65.2 7.7
Balsam fir.....	4"-9" 10" up	217.5 64.6	197.1 58.5	150.4 44.7	62.9 18.7	81.1 6.3	71.0 5.5	49.9 3.9	18.8 1.5
TOTAL CONIFERS.....	4"-9" 10" up	918.8 527.9	832.6 478.2	635.5 365.2	265.9 152.9	925.1 155.3	810.2 135.9	569.2 95.5	215.3 36.2
White birch.....	4"-9" 10" up	305.6 222.2	276.8 201.3	211.4 153.7	88.5 64.3	140.1 4.8	122.7 4.2	86.2 2.9	32.6 1.1
Poplar (all).....	4"-9" 10" up	360.9 697.6	327.1 632.0	249.7 482.5	104.5 201.9	742.7 163.0	650.3 142.7	456.9 100.3	172.9 37.9
TOTAL HARDWOODS.....	4"-9" 10" up	666.5 919.8	603.9 833.3	461.1 636.2	193.0 266.2	882.8 167.8	773.0 146.9	543.1 103.2	205.5 39.0
GRAND TOTAL.....	4"-9" 10" up	1585.3 1447.7	1436.5 1311.5	1096.6 1001.4	458.9 419.1	1807.9 323.1	1583.2 282.8	1112.3 198.7	420.8 75.2
TOTAL 4" UP.....		3033.0	2748.0	2098.0	878.0	2131.0	1866.0	1311.0	496.0



Forest tent caterpillar egg band surveys made in the fall by Forest Biology Rangers form the basis of infestation forecasts for the following year. Inset — forest tent caterpillar egg band on tree twig.

TABLE 21. — *Volume of the primary growing stock in cubic feet per acre.*  
*English River Section — 1951-52*

SPECIES	D.B.H.	CONIFEROUS MATURE (C-I)				CONIFEROUS IMMATURE (C-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine	4"-9" 10" up	.....	.....	.....	.....	2.0	1.9	1.4	.....
Red pine.....	4"-9" 10" up	0.5 18.1	0.5 17.1	0.4 13.5	.....	22.5 5.8	20.8 5.4	15.8 4.1	.....
Jack pine.....	4"-9" 10" up	526.8 504.2	497.2 475.7	394.3 377.4	481.1 161.2	785.5 113.2	727.3 104.8	552.6 79.7	473.4 23.9
White spruce.....	4"-9" 10" up	50.6 141.2	47.8 133.2	37.9 105.7	11.5 9.2	18.6 36.0	17.3 33.3	13.1 25.3	15.6
Black spruce.....	4"-9" 10" up	661.1 135.4	623.9 127.8	494.8 101.4	109.6 71.6	564.0 39.2	522.1 36.3	396.8 27.6	49.3
Balsam fir.....	4"-9" 10" up	155.8 25.4	147.1 23.9	116.6 19.0	17.8	101.2 14.2	93.7 13.1	71.2 10.0	10.6
TOTAL CONIFERS.....	4"-9" 10" up	1394.8 824.3	1316.5 777.7	1044.0 617.0	620.0 242.0	1493.8 208.4	1383.1 192.9	1050.9 146.7	548.9 23.9
White birch.....	4"-9" 10" up	72.5 31.4	68.4 29.6	54.3 23.5	20.7	53.4 13.4	49.5 12.4	37.6 9.4	10.7 10.5
Poplar (all).....	4"-9" 10" up	89.3 251.7	84.3 237.5	66.9 188.3	26.5 29.8	147.1 107.9	136.2 99.9	103.5 75.9	30.0
TOTAL HARDWOODS.....	4"-9" 10" up	161.8 283.1	152.7 267.1	121.2 211.8	47.2 29.8	200.5 121.3	185.7 112.3	141.1 85.3	40.7 10.5
GRAND TOTAL.....	4"-9" 10" up	1556.6 1107.4	1469.2 1044.8	1165.2 828.8	667.2 271.8	1694.3 329.7	1568.8 305.2	1192.0 232.0	589.6 34.4
TOTAL 4" UP.....		2664.0	2514.0	1994.0	939.0	2024.0	1874.0	1424.0	624.0
SPECIES	D.B.H.	HARDWOOD MATURE (H-I)				HARDWOOD IMMATURE (H-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
Jack pine.....	4"-9" 10" up	24.1 26.0	23.5 25.3	20.4 21.9	59.4	41.0 51.6	39.3 49.5	31.2 39.3	65.9
White spruce.....	4"-9" 10" up	23.3 61.2	22.7 59.5	19.7 51.5	.....	24.7 103.4	23.7 99.2	18.8 78.7	.....
Black spruce.....	4"-9" 10" up	18.4 13.3	17.8 13.0	15.5 11.2	42.6	11.8	11.3	9.0	.....
Balsam fir.....	4"-9" 10" up	45.1 13.0	44.0 12.6	38.0 10.9	.....	41.5 17.6	39.8 16.9	31.6 13.4	.....
TOTAL CONIFERS.....	4"-9" 10" up	110.9 113.5	108.0 110.4	93.6 95.5	102.0	119.0 172.6	114.1 165.6	90.6 131.4	65.9
White birch.....	4"-9" 10" up	234.6 119.2	228.3 116.1	197.7 100.5	19.8	187.8 13.1	180.3 12.5	143.1 9.9	211.2
Poplar (all).....	4"-9" 10" up	905.1 1156.7	881.2 1126.0	762.9 974.8	356.0 512.2	1046.1 431.4	1003.6 413.9	796.5 328.5	362.9
TOTAL HARDWOODS.....	4"-9" 10" up	1137.7 1277.9	1109.5 1242.1	960.6 1075.3	375.8 512.2	1233.9 444.5	1183.9 426.4	939.6 338.4	574.1
GRAND TOTAL.....	4"-9" 10" up	1248.7 1391.3	1217.5 1352.5	1054.2 1170.8	477.8 512.2	1352.9 617.1	1298.0 592.0	1030.2 469.8	640.0
TOTAL 4" UP.....		2640.0	2570.0	2225.0	990.0	1970.0	1890.0	1500.0	640.0

(Continued on page 36)



TABLE 21 (Cont'd)

SPECIES	D.B.H.	MIXEDWOOD MATURE (M-I)				MIXEDWOOD IMMATURE (M-II)			
		DENSITY CLASS				DENSITY CLASS			
		1	2	3	4	1	2	3	4
		cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.	cu. ft.
White pine.....	4"-9" 10" up	.....	.....	.....	33.5	.....	.....	.....	.....
Red pine.....	4"-9" 10" up	.....	.....	.....	.....	2.2 0.3	2.0 0.3	1.5 0.2	.....
Jack pine.....	4"-9" 10" up	155.2 282.0	146.8 266.6	117.0 212.6	97.1 180.4	290.5 138.0	267.7 127.2	200.7 95.3	255.8 94.6
White spruce.....	4"-9" 10" up	103.1 267.8	97.5 253.3	77.8 201.9	31.0 97.8	60.7 98.7	56.0 91.0	42.0 68.2	.....
Black spruce.....	4"-9" 10" up	219.1 105.5	207.2 99.8	165.2 79.5	46.1 .....	203.7 35.4	187.8 32.6	140.8 24.4	44.7 .....
Balsam fir.....	4"-9" 10" up	229.5 42.1	217.0 39.8	173.0 31.7	5.0 11.7	202.3 34.3	186.5 31.6	139.8 23.7	18.0 .....
TOTAL CONIFERS.....	4"-9" 10" up	706.9 697.4	668.5 659.5	533.0 525.7	179.2 323.4	759.4 306.7	700.0 282.7	524.8 211.8	318.5 94.6
White birch.....	4"-9" 10" up	171.9 63.2	162.6 59.8	129.6 47.7	145.5 .....	171.9 34.9	158.4 32.2	118.7 24.1	51.9 .....
Poplar (all).....	4"-9" 10" up	508.5 1164.1	480.8 1100.8	383.3 877.7	146.4 252.5	757.7 460.4	698.3 424.4	523.5 318.1	188.2 67.8
TOTAL HARDWOODS.....	4"-9" 10" up	680.4 1227.3	643.4 1160.6	512.9 925.4	291.9 252.5	929.6 495.3	856.7 456.6	642.2 342.2	240.1 67.8
GRAND TOTAL.....	4" 9" 10" up	1387.3 1924.7	1311.9 1820.1	1045.9 1451.1	471.1 575.9	1689.0 802.0	1556.7 739.3	1167.0 554.0	558.6 162.4
TOTAL 4" UP.....		3312.0	3132.0	2497.0	1047.0	2491.0	2296.0	1721.0	721.0



*Defoliation by the spruce budworm resulted in virtually complete mortality of balsam fir in many parts of northwestern Ontario.*







**Hon. Welland S. Gemmell**

*Minister*

**F. A. MacDougall**

*Deputy Minister*











3 1761 11546994 2

